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NATIONAL DAM SAFETY PROGRAM. TAMARACK DAM (MO 30452), MISSISSIP--ETC(U)
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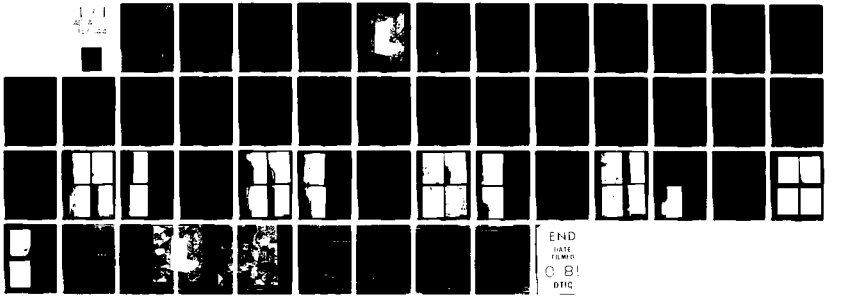

MISSISSIPPI-KASKASKIA-ST. LOUIS BASIN

TAMARACK DAM

JEFFERSON COUNTY, MISSOURI

MO 30452

(9) Final rept.,
(15) DACW43-78-C-0162
(11) Nov 78

(10) Henry M. /Reitz John J. /Bailey, Jr

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Tamarack Dam (MO 30452),
Mississippi - Kaskaskia - St. Louis Basin,
Jesserson County, Missouri. Phase I
Inspection Report.

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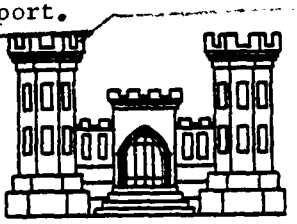

PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

NOVEMBER 1978

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Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

SUBJECT: Tamarack Dam, MO ID No. 30452
Phase I Dam Safety Inspection

This report presents the results of field inspection and evaluation of the Tamarack Dam.

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will not confine 50 percent of the Probable Maximum Flood.

2) Overtopping could result in dam failure.

3) Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: SIGNED
Chief, Engineering Division — 19 MAR 1979 Date

APPROVED BY: SIGNED
Colonel, CE, District Engineer — 20 MAR 1979 Date

PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	Tamarack Dam
State Located	Missouri
County Located	Jefferson County
Stream	Unnamed Tributary of Sand Creek
Date of Inspection	29 November and 2, 3 and 6 November 1978

Tamarack Dam was inspected by an interdisciplinary team of engineers from Reitz & Jens, Inc. under contract with the St. Louis District Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations and private engineers. Based on these guidelines this dam is classified as a small dam with a high downstream hazard potential. The estimated damage zone from failure of the dam extends two miles downstream from the dam.

Failure would threaten the life and property of seven familes and cause appreciable damage to three improved roads.

Our inspection and evaluation indicates that the dam is deficient in that the spillways do not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. Considering the volume of water impounded, the floodplain downstream and potential residential development downstream, the Probable Maximum Flood (PMF) is the appropriate spillway design flood. The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions reasonably possible in the region. The dam will begin to be overtopped by a flood having a discharge (peak and volume) equal to 50% of the PMF. The spillways will pass a 1% chance flood (100-year flood) without overtopping, which is a flood that has a 1% chance of being equalled or exceeded in any given year.

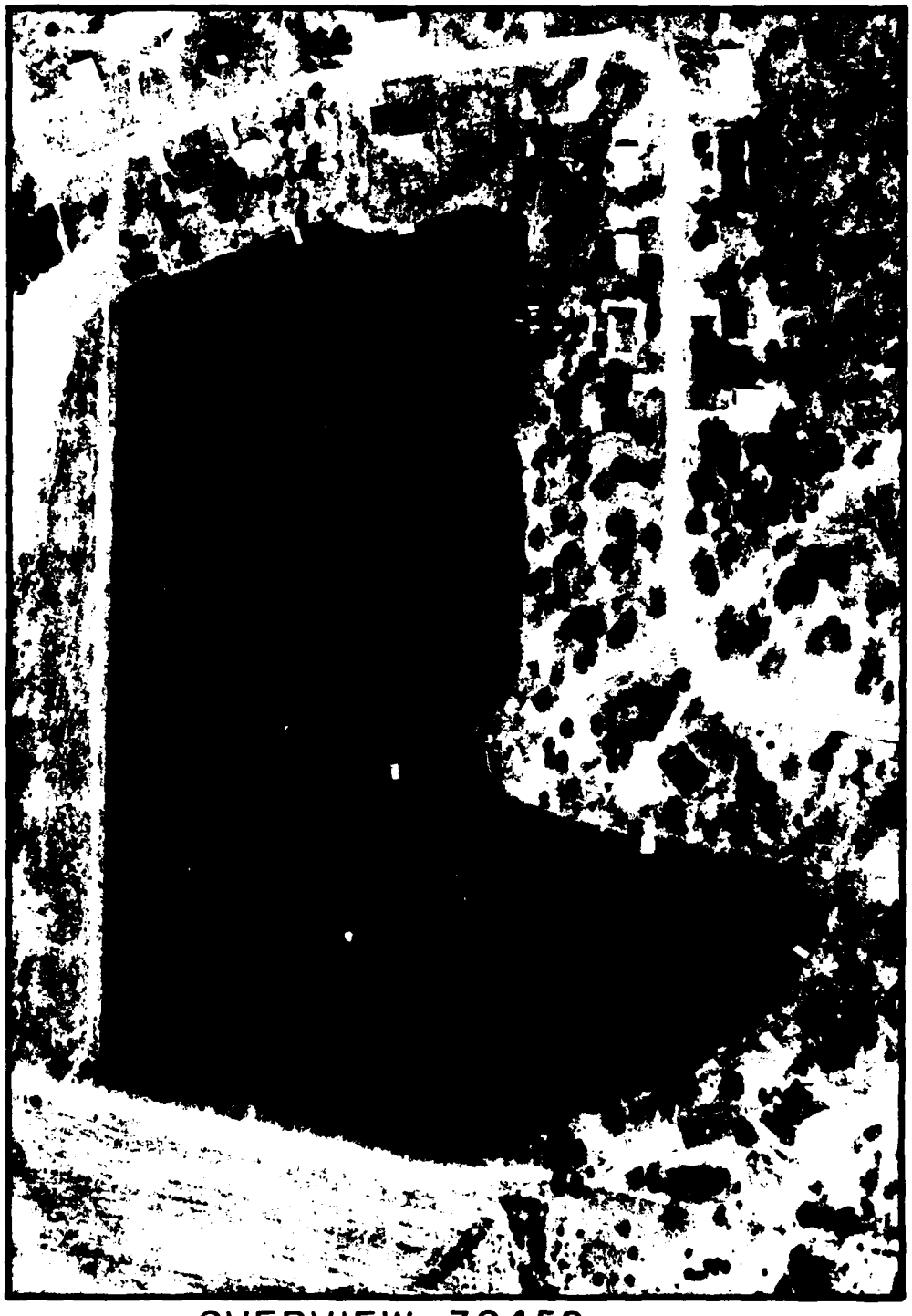
The inspection team observed indications of seepage or underseepage through or under the dam embankment. This is a serious safety deficiency which could lead to failure of the embankment. Immediate correction is recommended.

Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency.

We recommend the owner take immediate action to correct or control the deficiencies described.

HENRY M. REITZ, President
Reitz & Jens, Inc.

JOHN J. BAILEY, JR., Vice President
Chief Engineer
Reitz & Jens, Inc.



OVERVIEW-30452

PLATE 1

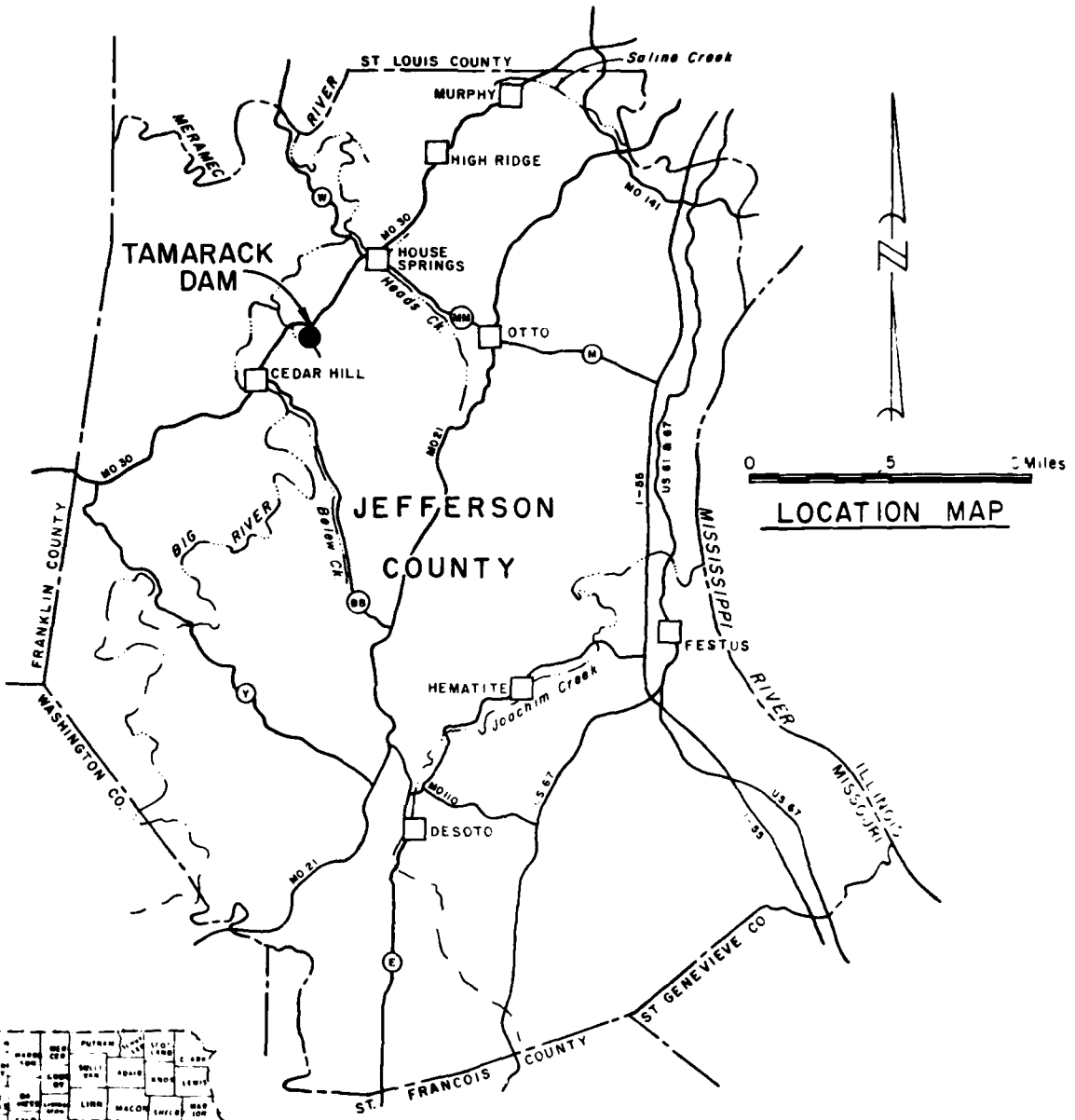

ST LOUIS COUNTY
Saline Creek
MERAMEC
RIVER
MURPHY
HIGH RIDGE
MO 141
MO 30
HOUSE SPRINGS
TAMARACK DAM
Hoods Ck.
OTTO
CEDAR HILL
MO 21
MO 30
FRANKLIN COUNTY
BIG RIVER
Bourbon Ck.
JEFFERSON COUNTY
I-55
US 61 67
MISSISSIPPI RIVER
FESTUS
HEMATITE
Joachim Creek
WASHINGTON CO.
MO 110
DESOTO
I-55
US 67
ILLINOIS
MISSOURI
MO 21
ST GENEVIEVE CO
ST. FRANCOIS COUNTY
N
0 5 Miles
LOCATION MAP
MISSOURI
0 100 mi.
VICINITY MAP

PLATE 2

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
Tamarack Dam, MO ID NO. 30452

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(Cont.)

LIST OF PLATES

LIST OF INDICES AND PHOTOGRAPH NUMBERS

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer contracted with Reitz & Jens, Inc. (Contract DACW43-78-C-0162) for a safety inspection of the Tamarack Dam, Mo. ID No. 30452.

b. Purpose of Inspection The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtenances The dam is an earth structure built at the lower end of a draw on the north side of the Sand Creek valley near the western end of Sand Ridge in Jefferson County. The dam axis runs essentially north/south. A low ridge extending west into the Sand Creek floodplain forms the south side of the reservoir. The north side of the reservoir is at the toe of a similar but longer and higher ridge. Most of the drainage area consists of a deep valley with steep rocky slopes rising to sharply defined ridges east of the reservoir. The area adjoining the lake on the north and east is subdivided along a road that parallels the edge of the lake. About 30 homes are built along this road, one-half of which have backyards that adjoin the lake. The remainder of the watershed is forested except for a small area of Highway 30 right-of-way at the north edge of the watershed. The spillway is a concrete structure at the south end of the dam. A sketch of this appears at the lower left corner of Plate 3.

Topography in the vicinity of the dam is shown on Plate 3.

Pertinent physical data are given in paragraph 1.3 below.

b. Location The dam is located in northwest Jefferson County about two miles northeast of Cedar Hill, as shown on Plate 2. The dam and lake are located in the NW¼ of the SE¼ of Section 18, T42N, R4E, and are shown on the Jefferson County Missouri Belew Creek and House Springs Quadrangle sheets, 1968 Editions. The dam and lake are not shown on the 1954 editions of these quadrangles.

c. Size Classification Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1.c above. Based on these criteria, this dam and impoundment are in the Small Size Category.

d. Hazard Classification Guidelines for determining hazard classification are presented in the same guidelines referenced in paragraph c above. Based on referenced guidelines, this dam is in the High Hazard Classification.

e. Ownership The dam is owned by Mr. Walter Ficken, President, Medley Hill Terrace Realty Co., Route 2, #165 Highway 30, Cedar Hill, Mo., 63016.

f. Purpose of Dam The dam forms a 15 -acre recreational lake.

g. Design and Construction History The inspection team was unable to find any design data on this dam. It appears from the recorded subdivision restrictions that the "Lake Tamarack" plat was recorded in 1964. It is probable that the dam was constructed within a year of this date.

h. Normal Operating Procedure Normal rainfall, runoff, transpiration and evaporation all combine to maintain a relatively stable water surface elevation. The maximum water depth ever experienced at the spillway is unknown.

1.3 PERTINENT DATA

a. Drainage Area - 128 acres

b. Discharge at Damsite

(1) All discharge at the damsite is through an uncontrolled spillway.

(2) Estimated experienced maximum flood at damsite - unknown.

(3) Estimated ungated spillway capacity at maximum pool elevation - 360 cfs.

c. Elevation (Feet Above M.S.L.)

(1) Top of dam - 519.0 to 521.0 (see Plate 3).

(2) Spillway crest - 515.9

(3) Streambed at centerline of dam - 491.0 (from survey)

(4) Maximum tailwater - unknown

d. Reservoir Length of maximum pool - 900 feet (dam is longer than reservoir length).

e. Storage

(1) Top of dam - 204 acre feet.

(2) Spillway crest - 141 acre feet

f. Reservoir Surface (Acres)

(1) Top of dam - 20.7 acres (estimated from USGS Map)

(2) Spillway crest - 15.9 acres

g. Dam

(1) Type - earth embankment

(2) Length - 950 feet

(3) Height - 29 feet maximum (from survey).

(4) Top width - 11± feet

(5) Side Slopes -

(a) Downstream - 1V on 2.5H (determined from section at Station 4+43).

(b) Upstream - 1V on 3H to water surface.

(6) Zoning - unknown

(7) Impervious core - unknown.

(8) Cutoff - unknown.

(9) Grout curtain - unknown.

h. Diversion and Regulating Tunnel - None

i. Spillway - concrete weir and paved channel.

j. Regulating Outlets There is a 4-inch pipe with a valve that appears to be at such an elevation and location that it can be used to withdraw water from the lake.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were found to be readily available

2.2 CONSTRUCTION

Property records would seem to indicate the dam was constructed within a year or two of 1964.

2.3 OPERATION

The maximum loading on the dam is unknown. The lake level seems to remain stable during average precipitation of 38 inches per year. There are no records of operation of the dam.

2.4 EVALUATION

a. Availability No engineering data were available

b. Adequacy Engineering data not being available, no detailed assessment of design, construction and operation could be made. The owner should have an engineer, experienced in the design of dams, perform detailed seepage and stability analyses comparable to the requirement of the "Recommended Guidelines for Safety Inspection of Dams".

However, for the size of dam, materials used and measurements taken, a satisfactory hydrologic/hydraulic evaluation resulted. Also, for the section and presence of the primary spillway plus the visual inspection of a dam with reservoir of at least 12 years of age, the generally good condition of the dam, when considered by the expereinced engineers, indicated that even though a detailed assessment of the design and construction in an analytical sense was not possible, a defensible evaluation of the dam as a structure was feasible.

c. Validity This report is primarily for safety through maintenance and operation and the conclusions and evaluation for this Phase I Inspection are considered adequate for the definitive statement in this report.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General An initial visual inspection of Tamarack dam was made on 29 November 1978. This followed three days of field measurements by a survey party on 2, 3 and 6 November 1978 and was followed by additional measurements on 30 November 1978. The training and experience of personnel in these inspections included hydrologic/hydraulic engineering, soils and materials engineering, surveying and structural engineering.

b. Dam This is an earth dam. Top width is 11 feet (Photos D-3, D-6). The downstream slope is 1V on 2.5H (D-2, D-4, D-5). The upstream slope, as measured above the water level, was 1V on 3H (D-3). The maximum height of dam is 29 feet. It is unusually long (D-1) for the length and size of the impoundment behind it.

The crest of the dam is nearly level, varying less than one foot over most of its length. There is no special erosion protection on the reservoir side (D-3). However, erosion has not been a problem due to the relatively short fetch across the lake. There is heavy grass turf on the upstream slope on the top of dam and on most of the downstream (D-2 through D-6) except for a relatively narrow tree-covered strip in the center part of the embankment (D-2, D-5). There were not any areas of hydrophilic plant growth at or above the toe of the dam. Fairly spongy ground was detected by a member of the inspection team when walking through the central quarter of the downstream slope in the north half of the dam (SE-1, SE-4). There were some burrow holes (SE-2, SE-3) in which free water was visible from 4 to 6 inches beneath ground surface, generally opposite Station 8+00 on the downstream toe. There were similar holes visible (S-5) near the edge of the lake on the upstream face of the dam at about the same station. These holes did not have all the characteristics of crawfish holes but were indicative of underground burrowing.

c. Appurtenant Structures At the toe of the dam there is a valve handle on a 4-inch diameter pipe in a vertical cylindrical steel riser (S-1, S-2, S-3). The valve is on the downstream face of the dam. Therefore, deterioration of the pipe to the reservoir side of the valve could result in greater piping gradients along the outside of pipe than predictable for other portions of the dam alignment and a potentially troublesome soil erosion from through-seepage.

The end of the pipe in the reservoir should be located and record of the location put with other information for the development. If a piping leak develops, this information is needed to stop the leak quickly.

The spillway, for both controlling the elevation of the lake and discharging all storm runoff (S-4, S-5), is on the south end of the dam and is a shallow "V" bottom concrete section with vertical side wall and discharges into a steep longitudinal gradient concrete paved channel of variable width and shape, though it is a rather flat transverse section. The discharge from this spillway is carried in a channel in virgin soil down the valley slope to a ditch paralleling the centerline of the dam (S-6) approximately 100 feet west of the centerline, well beyond the toe of the dam.

The spillway control structure is monolithically cast-formed portland cement concrete and shows good workmanship. The outlet channel adjoining the control structure is concrete lined with surface roughly trowelled without form work on a generally uniform slope for 50 feet through a 5 foot vertical change. The concrete surface is in good condition and no loss of soil next to or beneath concrete was observed

The reservoir area along the east side is a somewhat unkept bank (P-6) with weed growth but on other portions, generally, is a lawn yard portion of a residence. There are no signs of troublesome erosion or slides along the shore of the reservoir (P-1 through P-5).

d. Downstream Channel The downstream channel enters Sand Creek in a single-family residential area that is starting to be developed (V-1 through V-5). Sand Creek then meanders under two local service roads and ultimately, under Missouri Highway 30 to reach Big River about a mile to the northwest. There is a large oval oxidation pond downstream of the dam. The closest edge of this pond is about 100 feet from the toe of the dam which is more than adequate to allow inspection of the ground downstream for seepage and underseepage.

3.2 EVALUATION

Tamarack Dam, both as to the slopes of the earthen section and the concrete spillway structure and its outlet, is given periodic and apparently, rather frequent maintenance.

In the north half of the dam alignment there are signs of underseepage potential but with the relatively low head differential between lake level and downstream toe, the phreatic surface is neither above the lower portion of the downstream slope nor the natural ground beyond.

In shallow discontinuous depressions in the bottom of the swale which would be the path for discharge from the valved pipe discussed under spillways, water is standing at a higher elevation than in the flowing channel close and nearby. This is interpreted to indicate there is some underseepage.

The downstream location of the valve is an additional potential source of troublesome piping through the dam.

Cutting of shrubs and trees on the downstream slope, while it is not complete for the entire length of the dam, can and should be improved but it is not considered a serious deficiency.

The reservoir slope of the dam is covered with a thick turf down to the water's edge. The slope is not protected from erosion by an armor-coat; however, for the physical situation of the dam, this is not a serious deficiency.

The relatively high degree of development in the area immediately down-valley from the dam as a single-family residential subdivision, is a factor that suggests the need for Tamarack Dam to be evaluated against most stringent safety criteria.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no controlled outlet works for this dam; therefore, no regulating procedures exist. The pool is controlled by rainfall, runoff, evapoartion and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

Based on the amount of brush on portions of the downstream slope, more attention should be given to control of vegetation on the dam.

4.3 MAINTENANCE OF OPERATION FACILITIES

No operating facilities except the valve and 4-inch pipe described in paragraph 3.1.c, exist at this dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

Some additional attention should be given to control of small tree and brush growth on and near the toe of the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data No design data are available.

b. Experience Data The drainage area is developed from USGS Belew Creek and House Springs Missouri Quadrangle. Also available are 1"=2000' aerial stereo pairs taken 9 April 1977, by Surdex Corporation. Lake area is measured on a 1"=200' enlargement of a portion of one of these photographs and shown on Plate 1. The spillway and dam layout are from surveys made during the inspection.

c. Visual Observations

(1) Spillway and paved exit channel are in good condition.

(2) It appears a 4-inch pipe is available to evacuate the pool. A valve is on this pipe at the toe of dam which was closed.

(3) The spillway crest has a row of fence posts projecting from it. Apparently, a wire mesh fence was strung across the spillway at one time. This fence should not be replaced since it could clog with leaves and other debris and seriously reduce the spillway capacity.

Difference in grade on the top of dam at the north end suggests a second emergency spillway, however local low elevation is higher than most of the top of dam.

All of the flow is in the south spillway.

d. Overtopping Potential The spillway is too small to pass the minimum required flood of the probable maximum without overtopping. The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions reasonably possible in the region. The dam will start to be overtopped by a flood equal to 50% of the PMF. The PMF will overtop the dam to a maximum depth of about 1.2 feet. The depth will vary to zero across the dam because of the sloping crest. A width of 800 feet of dam crest will be subject to some overtopping flow. Maximum rate of flow over the dam crest will be about 1300 cubic feet per second and about another 600 cfs over the spillway. Overtopping flow will have a duration of about 3 hours. The existing lake and principal spillway will contain a 100-year frequency flood below the crest of the emergency spillway.

According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, the 100-year frequency flood is only adequate for a low hazard dam of small size.

The effect from rupture of the dam could extend approximately two miles downstream of the dam. There are seven inhabited homes downstream of the dam which could be severely damaged and lives of the inhabitants could be lost should failure of the dam occur.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations Visual observations which adversely affect structural stability of this dam are discussed in Section 3, paragraph 3.1.b.

b. Design and Construction Data No design or construction data relating to the structural stability of the dam were found.

c. Operating Records No appurtenant structures requiring operation exist at this dam with the exception of the 4-inch valve described in paragraph 3.1.c.

d. Post Construction Changes No post construction changes, other than those referenced in paragraph a above, exist which will affect the structural stability of the dam.

e. Seismic Stability Considering the seismic zone (2) in which this dam is located, an earthquake of this magnitude is not expected to cause a structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety **The spillway can pass 50 percent of Probable Maximum Flood (PMF). Considering the volume of water impounded, the floodplain downstream and the residential development downstream, the 100 percent PMF is the appropriate spillway design flood.**

The reservoir and principal spillway are adequate to contain a flood which has a 1% chance of being exceeded (100-year flood) in any given year.

There was one item noted during the visual inspection by the inspection team which should be corrected or controlled. This is the apparent seepage or underseepage at the toe of the dam which, if uncorrected, could lead to serious potential of failure by piping through the dam embankment.

Seepage and stability analyses comparable to the requirements of the "Recommended Guidelines for Safety Inspection of Dams" were not available which is considered a deficiency.

b. Adequacy of Information Due to lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers these data sufficient to support the conclusions herein.

c. Urgency The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. If the safety deficiencies listed in paragraph a are not corrected in the near future, they will continue to deteriorate and lead to a serious potential of failure.

d. Necessity for Phase II Based on the results of the Phase I Inspection no Phase II Inspection is recommended.

e. Seismic Stability This dam is located in Seismic Zone 2. An earthquake of this magnitude is not expected to be hazardous to this dam.

7.2 REMEDIAL MEASURES

a. Recommendations The owner should obtain the services of an engineer experienced in the design and construction of dams to design and observe construction of remedial measures including the following:

(1) Spillway size and/or height of dam should be increased to pass the Probable Maximum Flood.

(2) Perform stability and seepage analyses and investigate existing apparent seepage and/or underseepage at the toe of the dam.

(3) Provide berms, filters, drains or other methods of controlling the effects of seepage and underseepage or take necessary steps to stop such seepage.

b. O&M Maintenance and Procedures The following O&M maintenance and procedures are recommended:

(1) Remove uncontrolled vegetation growth on the downstream slope of the dam.

(2) After removal of existing uncontrolled vegetation growth, vegetation on the entire dam should be periodically mowed.

(3) Periodically check the condition of the 4-inch steel pipe through the dam for evidence of corrosion and leakage. Water leaking into or out of a corroded pipe could cause piping failure of the earth embankment. At least in spring, summer and fall seasons of each year trial operate the valve.

(4) Remove or cut off fence posts on the spillway crest to discourage reinstallation of the screen fence at this location.

(5) Take steps to control the animal burrows near the toe of the dam and the edge of the lake.

(6) After completion of remedial measures, detailed inspections of the dam should be made periodically by an engineer experienced in the design and construction of dams. Records should be kept of these repairs and major maintenance.

APPENDIX A

HYDROLOGIC CALCULATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routine. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33". Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques where the flood hydrograph is routed through lake storage. Hydraulic capacities of the spillway and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-area curve. The hydraulic capacity of the spillway and the sloping top of dam is defined by a composite elevation discharge curve.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on Plate 1A. Definitions of these variables are contained in the "User's Manual" for the computer program.

5. The discharge in the spillway was calculated using critical depth at the control section about 20 feet downstream from where the dam centerline crosses the spillway channel at the headwall. A drawdown curve, taking account of friction losses and velocity head changes, was calculated upstream to the reservoir to establish energy grades for the various rates of spillway flow.

6. Discharge over the irregular top of dam (the crest is not level) was calculated using a coefficient of 3.0 in the broad-crested weir equation for the sections of dam crest at different elevations. One hundred feet of the berm along the spillway channel was included as part of the dam crest. All spillway and overtopping discharges were included in a composite rating curve. Dummy values of 0.1 for dam length, coefficient of discharge and exponent were entered on the $D card to suppress diagnostic statements in the output. The amount of this dummy flow is never greater than 0.02 cfs.

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********************************
    1                 A  ********** ID # 30452 TAMARACK DAM * ADD 415 FOR USGS ELEV.*********
    2                 A  ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
    3                 A  ********** REITZ & JENS, INC. -    SEPTEMBER 1979 ******************
    4                 B    288       0        5       -0       -0       -3       -0       -0       -4       -0
    5                 I      5
    6                 I      1        5        1
    7                 J1  0.40     0.45     0.50     0.55     1.00
    8                 K      0    PMF                          1        3        1
    9                 1  ***** INFLOW HYDROGRAPH - SCS METHOD *****
   10                 M      1       12   0.201                                                  1
   11                 P             25.0      101      120      130
   12                 T                                                      -1      -88              0.12
   13                 W2            0.17
   14                 X            -0.10      2.0
   15                 K      1       14                          1                1
   16                 1  ***** RESERVOIR ROUTING - PIPE & SPILLWAY EQUATIONS - SLOPING DAM *****
   17                 Y                                     1        1
   18                 Y1     1                                                -100.7       -1
   19                 Y4  100.7    101.0    101.5    102.0    102.5    103.0    103.5    104.1    104.6    105.0
   20                 Y4  105.5    106.0    106.5
   21                 Y5    0.0      4.0     20.0     57.0    111.0    180.0    259.0    360.0    628.0   1140.0
   22                 Y52373.0   4234.0   6628.0
   23                 $A    0.0    15.61     21.8     25.9
   24                 $E     75      100      105      115
   25                 $$  100.7
   26                 $D  104.1      0.1      0.1      0.1
   27                 K      99
```

PLATE A-1
Sheet 1 of 5

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********************************

RUN  DATE= 12/15/78.
     TIME= 11.36.43.


* ********** ID # 30452 TAMARACK DAM * AND 415 FOR USGS ELEV.**********
 ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
 ********** REITZ & JENS, INC. -     SEPTEMBER 1978 ******************

                                JOB SPECIFICATION
      NO      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     288       0        5       -0       -0       -0       -0       -0       -4       -0
                              JOPER      NWT    LROPT    TRACE
                                  5       -0       -0       -0

                          MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 1 NRTIO= 5 LRTIO= 1
          RTIOS=    .40     .45     .50     .55    1.00


**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

      ***** INFLOW HYDROGRAPH - SCS METHOD *****
                    ISTAO   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    PMF         0      -0      -0       1       3       1      -0      -0

                                HYDROGRAPH DATA
       IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
           1       2     .20   -0.00     .20    1.00  -0.000      -0       1      -0

                                PRECIP DATA
              SPFE     PMS      R6     R12     R24     R48     R72     R96
             -0.00   25.00  121.00  120.00  130.00   -0.00   -0.00   -0.00

                                LOSS DATA
        LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
           -0   -0.00   -0.00    1.00   -0.00   -0.00    1.00   -1.00  -88.00   -0.00     .12

        CURVE NO =  -88.00  WETNESS =   -1.00  EFFECT OF =   98.00

                              UNIT HYDROGRAPH DATA
                          TC= -0.00    LAG=   .17

                              RECESSION DATA
                       STRTQ=   -0.00    QRCSN=    -.10    RTIOR= 2.00

      UNIT HYDROGRAPH 12 END OF PERIOD ORDINATES. TC=   -0.00 HOURS. LAG=    .17  VOL= 1.00
    139.     422.     434.     272.     136.      73.      37.      20.      11.       6.
      3.       1.

      0                         END-OF-PERIOD FLOW
    MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q
```

PLATE A-1
Sheet 2 of 5

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	0.	1.01	12.05	145	.21	.20	.01	118.
1.01	.10	2	.01	.00	.01	1.	1.01	12.10	146	.21	.20	.01	177.
1.01	.15	3	.01	.00	.01	2.	1.01	12.15	147	.21	.20	.01	238.
1.01	.20	4	.01	.00	.01	2.	1.01	12.20	148	.21	.20	.01	277.
1.01	.25	5	.01	.00	.01	2.	1.01	12.25	149	.21	.20	.01	296.
1.01	.30	6	.01	.00	.01	2.	1.01	12.30	150	.21	.21	.01	307.
1.01	.35	7	.01	.00	.01	3.	1.01	12.35	151	.21	.21	.01	313.
1.01	.40	8	.01	.00	.01	3.	1.01	12.40	152	.21	.21	.00	316.
1.01	.45	9	.01	.00	.01	3.	1.01	12.45	153	.21	.21	.00	318.
1.01	.50	10	.01	.00	.01	3.	1.01	12.50	154	.21	.21	.00	319.
1.01	.55	11	.01	.00	.01	3.	1.01	12.55	155	.21	.21	.00	320.
1.01	1.00	12	.01	.00	.01	3.	1.01	13.00	156	.21	.21	.00	320.
1.01	1.05	13	.01	.00	.01	3.	1.01	13.05	157	.25	.25	.00	326.
1.01	1.10	14	.01	.00	.01	3.	1.01	13.10	158	.25	.25	.00	344.
1.01	1.15	15	.01	.00	.01	3.	1.01	13.15	159	.25	.25	.00	362.
1.01	1.20	16	.01	.00	.01	3.	1.01	13.20	160	.25	.25	.00	374.
1.01	1.25	17	.01	.00	.01	3.	1.01	13.25	161	.25	.25	.00	380.
1.01	1.30	18	.01	.00	.01	3.	1.01	13.30	162	.25	.25	.00	383.
1.01	1.35	19	.01	.00	.01	3.	1.01	13.35	163	.25	.25	.00	385.
1.01	1.40	20	.01	.00	.01	3.	1.01	13.40	164	.25	.25	.00	386.
1.01	1.45	21	.01	.00	.01	3.	1.01	13.45	165	.25	.25	.00	387.
1.01	1.50	22	.01	.00	.01	3.	1.01	13.50	166	.25	.25	.00	387.
1.01	1.55	23	.01	.00	.01	3.	1.01	13.55	167	.25	.25	.00	388.
1.01	2.00	24	.01	.00	.01	3.	1.01	14.00	168	.25	.25	.00	388.
1.01	2.05	25	.01	.00	.01	4.	1.01	14.05	169	.32	.31	.00	397.
1.01	2.10	26	.01	.00	.01	4.	1.01	14.10	170	.32	.31	.00	424.
1.01	2.15	27	.01	.00	.01	4.	1.01	14.15	171	.32	.31	.00	451.
1.01	2.20	28	.01	.00	.01	5.	1.01	14.20	172	.32	.31	.00	468.
1.01	2.25	29	.01	.00	.01	5.	1.01	14.25	173	.32	.31	.00	477.
1.01	2.30	30	.01	.00	.01	5.	1.01	14.30	174	.32	.31	.00	482.
1.01	2.35	31	.01	.00	.01	6.	1.01	14.35	175	.32	.31	.00	484.
1.01	2.40	32	.01	.00	.01	6.	1.01	14.40	176	.32	.31	.00	486.
1.01	2.45	33	.01	.00	.01	6.	1.01	14.45	177	.32	.31	.00	486.
1.01	2.50	34	.01	.00	.01	6.	1.01	14.50	178	.32	.31	.00	487.
1.01	2.55	35	.01	.00	.01	7.	1.01	14.55	179	.32	.31	.00	487.
1.01	3.00	36	.01	.00	.01	7.	1.01	15.00	180	.32	.31	.00	488.
1.01	3.05	37	.01	.00	.01	7.	1.01	15.05	181	.19	.19	.00	471.
1.01	3.10	38	.01	.01	.01	7.	1.01	15.10	182	.38	.38	.00	445.
1.01	3.15	39	.01	.01	.01	8.	1.01	15.15	183	.38	.38	.00	473.
1.01	3.20	40	.01	.01	.01	8.	1.01	15.20	184	.58	.57	.00	549.
1.01	3.25	41	.01	.01	.01	8.	1.01	15.25	185	.67	.67	.00	678.
1.01	3.30	42	.01	.01	.01	8.	1.01	15.30	186	1.63	1.62	.01	951.
1.01	3.35	43	.01	.01	.01	9.	1.01	15.35	187	2.69	2.68	.01	1604.
1.01	3.40	44	.01	.01	.01	9.	1.01	15.40	188	1.06	1.05	.00	2293.
1.01	3.45	45	.01	.01	.01	9.	1.01	15.45	189	.67	.67	.00	2300.
1.01	3.50	46	.01	.01	.01	9.	1.01	15.50	190	.58	.57	.00	1853.
1.01	3.55	47	.01	.01	.01	9.	1.01	15.55	191	.38	.38	.00	1400.
1.01	4.00	48	.01	.01	.01	10.	1.01	16.00	192	.38	.38	.00	1070.
1.01	4.05	49	.01	.01	.01	10.	1.01	16.05	193	.29	.29	.00	841.
1.01	4.10	50	.01	.01	.01	10.	1.01	16.10	194	.29	.29	.00	680.
1.01	4.15	51	.01	.01	.01	10.	1.01	16.15	195	.29	.29	.00	578.
1.01	4.20	52	.01	.01	.01	10.	1.01	16.20	196	.29	.29	.00	521.
1.01	4.25	53	.01	.01	.01	11.	1.01	16.25	197	.29	.29	.00	491.
1.01	4.30	54	.01	.01	.01	11.	1.01	16.30	198	.29	.29	.00	473.
1.01	4.35	55	.01	.01	.01	11.	1.01	16.35	199	.29	.29	.00	464.
1.01	4.40	56	.01	.01	.01	11.	1.01	16.40	200	.29	.29	.00	460.
1.01	4.45	57	.01	.01	.01	11.	1.01	16.45	201	.29	.29	.00	458.
1.01	4.50	58	.01	.01	.01	11.	1.01	16.50	202	.29	.29	.00	458.
1.01	4.55	59	.01	.01	.01	12.	1.01	16.55	203	.29	.29	.00	457.
1.01	5.00	60	.01	.01	.01	12.	1.01	17.00	204	.29	.29	.00	457.

1.01	5.05	61	.01	.01	.01	12.	1.01	17.05	205	.23	.23	.00	449.
1.01	5.10	62	.01	.01	.01	12.	1.01	17.10	206	.23	.23	.00	422.
1.01	5.15	63	.01	.01	.01	12.	1.01	17.15	207	.23	.23	.00	395.
1.01	5.20	64	.01	.01	.01	12.	1.01	17.20	208	.23	.23	.00	378.
1.01	5.25	65	.01	.01	.01	12.	1.01	17.25	209	.23	.23	.00	369.
1.01	5.30	66	.01	.01	.01	12.	1.01	17.30	210	.23	.23	.00	364.
1.01	5.35	67	.01	.01	.01	13.	1.01	17.35	211	.23	.23	.00	362.
1.01	5.40	68	.01	.01	.01	13.	1.01	17.40	212	.23	.23	.00	361.
1.01	5.45	69	.01	.01	.01	13.	1.01	17.45	213	.23	.23	.00	360.
1.01	5.50	70	.01	.01	.01	13.	1.01	17.50	214	.23	.23	.00	360.
1.01	5.55	71	.01	.01	.01	13.	1.01	17.55	215	.23	.23	.00	360.
1.01	6.00	72	.01	.01	.01	13.	1.01	18.00	216	.23	.23	.00	359.
1.01	6.05	73	.07	.04	.02	18.	1.01	18.05	217	.02	.02	.00	330.
1.01	6.10	74	.07	.04	.02	32.	1.01	18.10	218	.02	.02	.00	241.
1.01	6.15	75	.07	.04	.02	48.	1.01	18.15	219	.02	.02	.00	217.
1.01	6.20	76	.07	.05	.02	58.	1.01	18.20	220	.02	.02	.00	202.
1.01	6.25	77	.07	.05	.02	64.	1.01	18.25	221	.02	.02	.00	189.
1.01	6.30	78	.07	.05	.02	68.	1.01	18.30	222	.02	.02	.00	176.
1.01	6.35	79	.07	.05	.02	71.	1.01	18.35	223	.02	.02	.00	164.
1.01	6.40	80	.07	.05	.02	73.	1.01	18.40	224	.02	.02	.00	153.
1.01	6.45	81	.07	.05	.02	75.	1.01	18.45	225	.02	.02	.00	143.
1.01	6.50	82	.07	.05	.01	77.	1.01	18.50	226	.02	.02	.00	133.
1.01	6.55	83	.07	.05	.01	78.	1.01	18.55	227	.02	.02	.00	124.
1.01	7.00	84	.07	.05	.01	79.	1.01	19.00	228	.02	.02	.00	116.
1.01	7.05	85	.07	.05	.01	81.	1.01	19.05	229	.02	.02	.00	108.
1.01	7.10	86	.07	.05	.01	82.	1.01	19.10	230	.02	.02	.00	101.
1.01	7.15	87	.07	.05	.01	83.	1.01	19.15	231	.02	.02	.00	94.
1.01	7.20	88	.07	.05	.01	83.	1.01	19.20	232	.02	.02	.00	88.
1.01	7.25	89	.07	.06	.01	84.	1.01	19.25	233	.02	.02	.00	82.
1.01	7.30	90	.07	.06	.01	85.	1.01	19.30	234	.02	.02	.00	77.
1.01	7.35	91	.07	.06	.01	86.	1.01	19.35	235	.02	.02	.00	71.
1.01	7.40	92	.07	.06	.01	86.	1.01	19.40	236	.02	.02	.00	67.
1.01	7.45	93	.07	.06	.01	87.	1.01	19.45	237	.02	.02	.00	62.
1.01	7.50	94	.07	.06	.01	88.	1.01	19.50	238	.02	.02	.00	58.
1.01	7.55	95	.07	.06	.01	88.	1.01	19.55	239	.02	.02	.00	54.
1.01	8.00	96	.07	.06	.01	89.	1.01	20.00	240	.02	.02	.00	51.
1.01	8.05	97	.07	.06	.01	89.	1.01	20.05	241	.02	.02	.00	47.
1.01	8.10	98	.07	.06	.01	90.	1.01	20.10	242	.02	.02	.00	44.
1.01	8.15	99	.07	.06	.01	90.	1.01	20.15	243	.02	.02	.00	41.
1.01	8.20	100	.07	.06	.01	91.	1.01	20.20	244	.02	.02	.00	38.
1.01	8.25	101	.07	.06	.01	91.	1.01	20.25	245	.02	.02	.00	36.
1.01	8.30	102	.07	.06	.01	91.	1.01	20.30	246	.02	.02	.00	33.
1.01	8.35	103	.07	.06	.01	92.	1.01	20.35	247	.02	.02	.00	32.
1.01	8.40	104	.07	.06	.01	92.	1.01	20.40	248	.02	.02	.00	32.
1.01	8.45	105	.07	.06	.01	93.	1.01	20.45	249	.02	.02	.00	32.
1.01	8.50	106	.07	.06	.01	93.	1.01	20.50	250	.02	.02	.00	32.
1.01	8.55	107	.07	.06	.01	93.	1.01	20.55	251	.02	.02	.00	32.
1.01	9.00	108	.07	.06	.01	93.	1.01	21.00	252	.02	.02	.00	32.
1.01	9.05	109	.07	.06	.01	94.	1.01	21.05	253	.02	.02	.00	32.
1.01	9.10	110	.07	.06	.01	94.	1.01	21.10	254	.02	.02	.00	32.
1.01	9.15	111	.07	.06	.01	94.	1.01	21.15	255	.02	.02	.00	32.
1.01	9.20	112	.07	.06	.00	94.	1.01	21.20	256	.02	.02	.00	32.
1.01	9.25	113	.07	.06	.00	95.	1.01	21.25	257	.02	.02	.00	32.
1.01	9.30	114	.07	.06	.00	95.	1.01	21.30	258	.02	.02	.00	32.
1.01	9.35	115	.07	.06	.00	95.	1.01	21.35	259	.02	.02	.00	32.
1.01	9.40	116	.07	.06	.00	95.	1.01	21.40	260	.02	.02	.00	32.
1.01	9.45	117	.07	.06	.00	96.	1.01	21.45	261	.02	.02	.00	32.
1.01	9.50	118	.07	.06	.00	96.	1.01	21.50	262	.02	.02	.00	32.
1.01	9.55	119	.07	.06	.00	96.	1.01	21.55	263	.02	.02	.00	32.
1.01	10.00	120	.07	.06	.00	96.	1.01	22.00	264	.02	.02	.00	32.

PLATE A-1
Sheet 4 of 5

1.01	10.05	121	.07	.06	.00	96.	1.01	22.15	265	.02	.02	.00	32.
1.01	10.10	122	.07	.06	.00	96.	1.01	22.10	266	.02	.02	.00	32.
1.01	10.15	123	.07	.06	.00	97.	1.01	22.15	267	.02	.02	.00	32.
1.01	10.20	124	.07	.06	.00	97.	1.01	22.20	268	.02	.02	.00	32.
1.01	10.25	125	.07	.06	.00	97.	1.01	22.25	269	.02	.02	.00	32.
1.01	10.30	126	.07	.06	.00	97.	1.01	22.30	270	.02	.02	.00	32.
1.01	10.35	127	.07	.06	.00	97.	1.01	22.35	271	.02	.02	.00	32.
1.01	10.40	128	.07	.06	.00	97.	1.01	22.40	272	.02	.02	.00	32.
1.01	10.45	129	.07	.06	.00	97.	1.01	22.45	273	.02	.02	.00	32.
1.01	10.50	130	.07	.06	.00	98.	1.01	22.50	274	.02	.02	.00	32.
1.01	10.55	131	.07	.06	.00	98.	1.01	22.55	275	.02	.02	.00	32.
1.01	11.00	132	.07	.06	.00	98.	1.01	23.00	276	.02	.02	.00	32.
1.01	11.05	133	.07	.06	.00	98.	1.01	23.05	277	.02	.02	.00	32.
1.01	11.10	134	.07	.06	.00	98.	1.01	23.10	278	.02	.02	.00	32.
1.01	11.15	135	.07	.06	.00	98.	1.01	23.15	279	.02	.02	.00	32.
1.01	11.20	136	.07	.06	.00	98.	1.01	23.20	280	.02	.02	.00	32.
1.01	11.25	137	.07	.06	.00	98.	1.01	23.25	281	.02	.02	.00	32.
1.01	11.30	138	.07	.06	.00	98.	1.01	23.30	282	.02	.02	.00	32.
1.01	11.35	139	.07	.06	.00	98.	1.01	23.35	283	.02	.02	.00	32.
1.01	11.40	140	.07	.06	.00	99.	1.01	23.40	284	.02	.02	.00	32.
1.01	11.45	141	.07	.06	.00	99.	1.01	23.45	285	.02	.02	.00	32.
1.01	11.50	142	.07	.06	.00	99.	1.01	23.50	286	.02	.02	.00	32.
1.01	11.55	143	.07	.06	.00	99.	1.01	23.55	287	.02	.02	.00	32.
1.01	12.00	144	.07	.06	.00	99.	1.01	24.00	288	.02	.02	.00	32.

SUM 32.50 31.11 1.39 40930.
(825.) (790.) (35.) (1159.)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2300.	537.	173.	173.	40926.
CMS	65.	15.	5.	5.	1159.
INCHES		24.95	32.09	32.09	32.09
CM		633.73	815.12	815.12	815.12
AC-FT		244.	344.	344.	344.
THOUS CU M		328.	424.	424.	424.

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	100.70	100.70	104.10
STORAGE	141.	141.	204.
OUTFLOW	0.	0.	360.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.40	103.80	0.00	198.	310.	0.00	16.08	0.00
.45	104.06	0.00	203.	354.	0.00	16.08	0.00
.50	104.27	.17	208.	454.	.58	16.08	0.00
.55	104.46	.36	212.	561.	.92	16.00	0.00
1.00	105.32	1.22	230.	1326.	3.25	15.83	0.00

PLATE A-1
Sheet 5 of 5

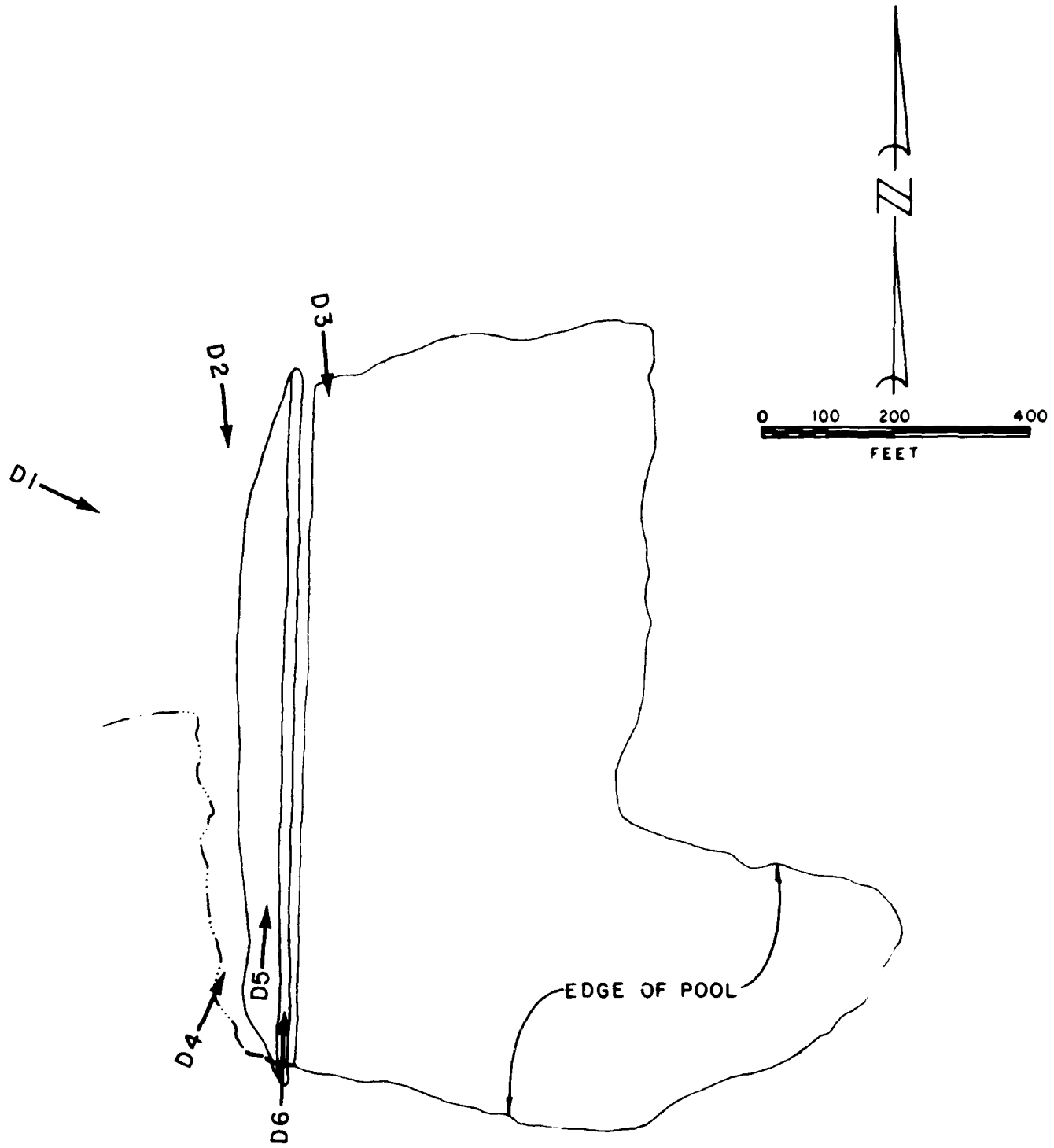


PHOTO INDEX I
FOR
DAM

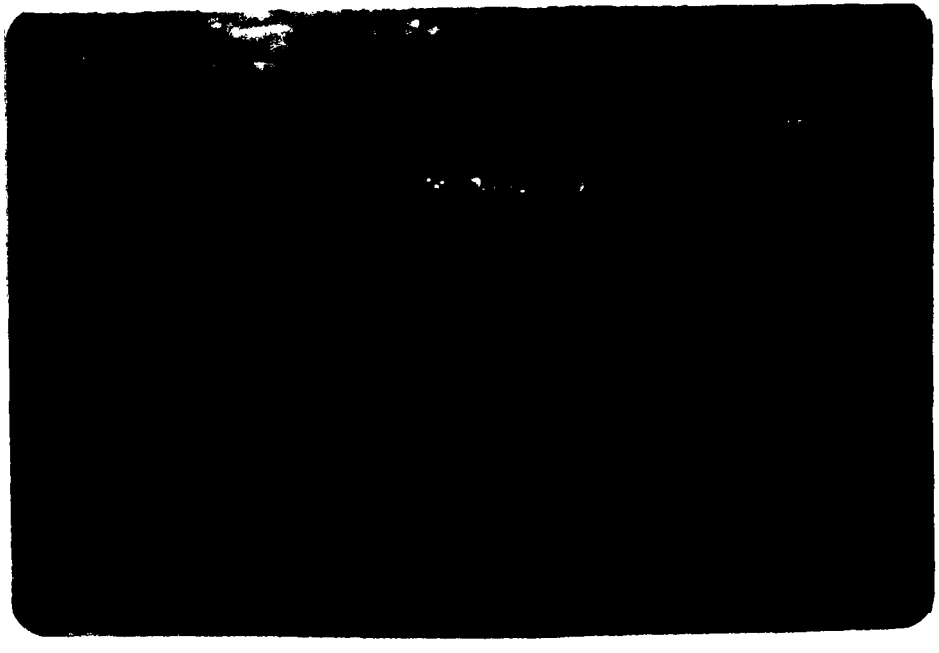
TAMARACK DAM
JEFFERSON COUNTY, MO.
NOVEMBER 1978

PREPARED BY
REITZ & JENS, INC.

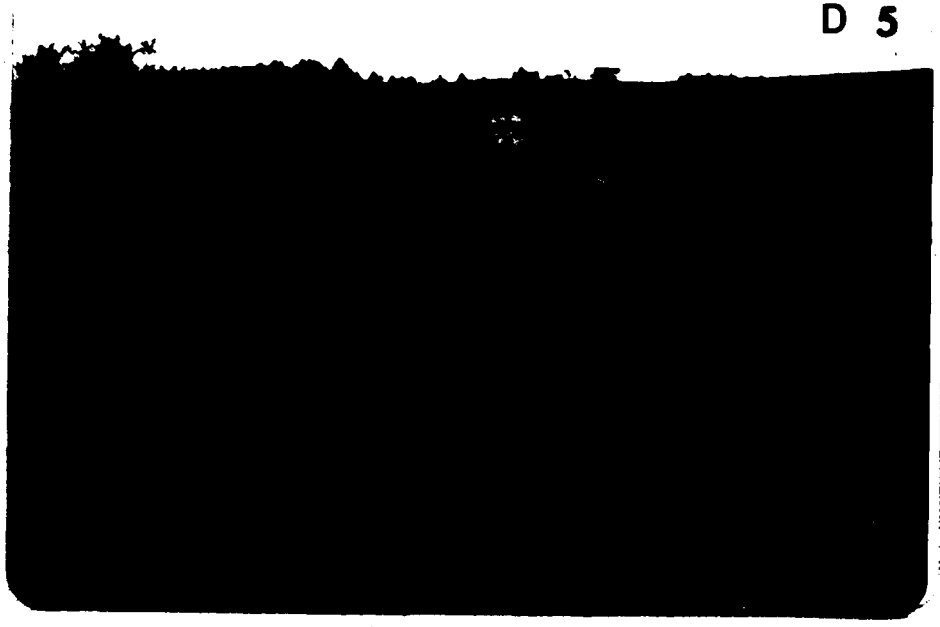

D 1


D 2


DAM



D 5



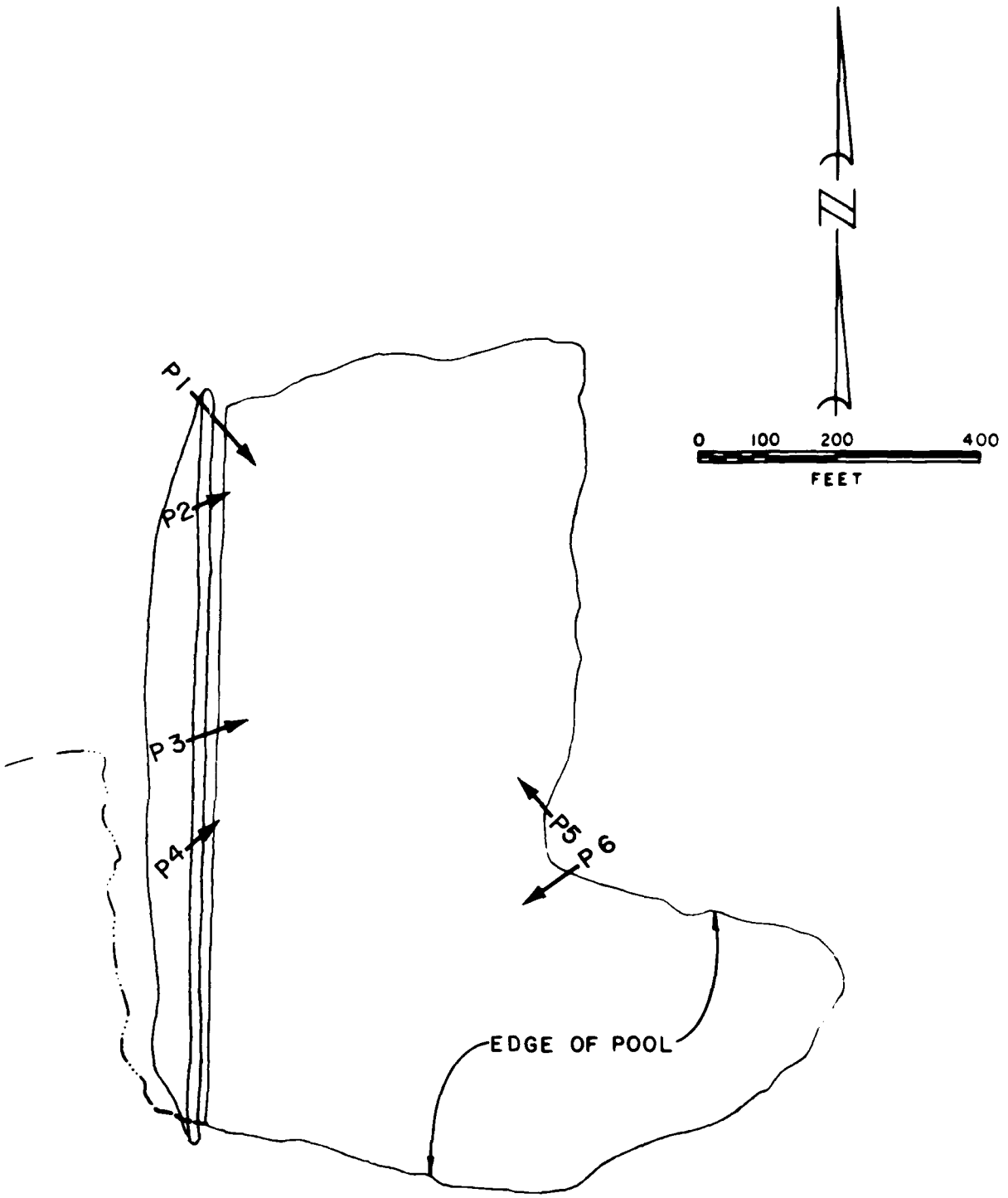
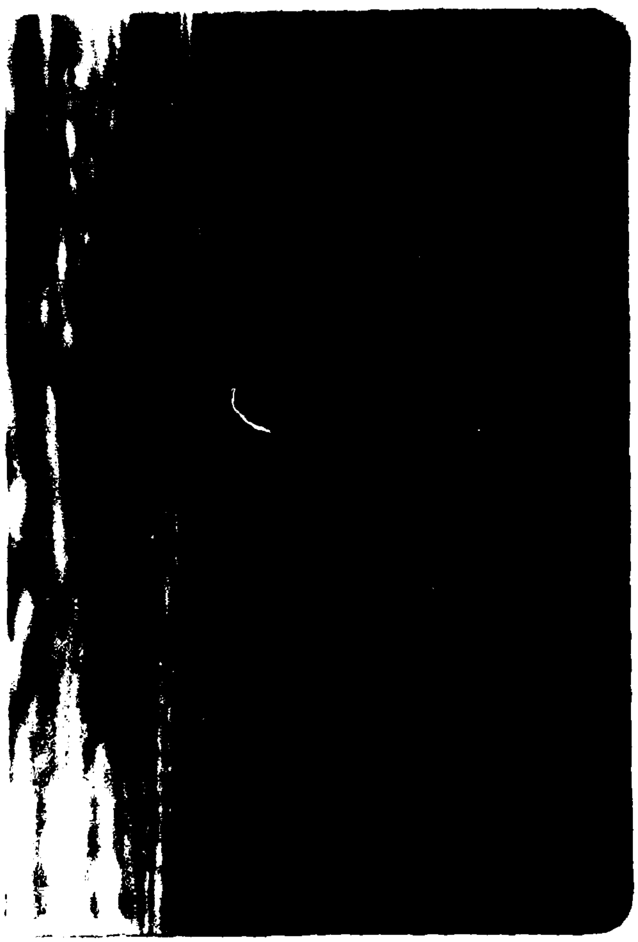


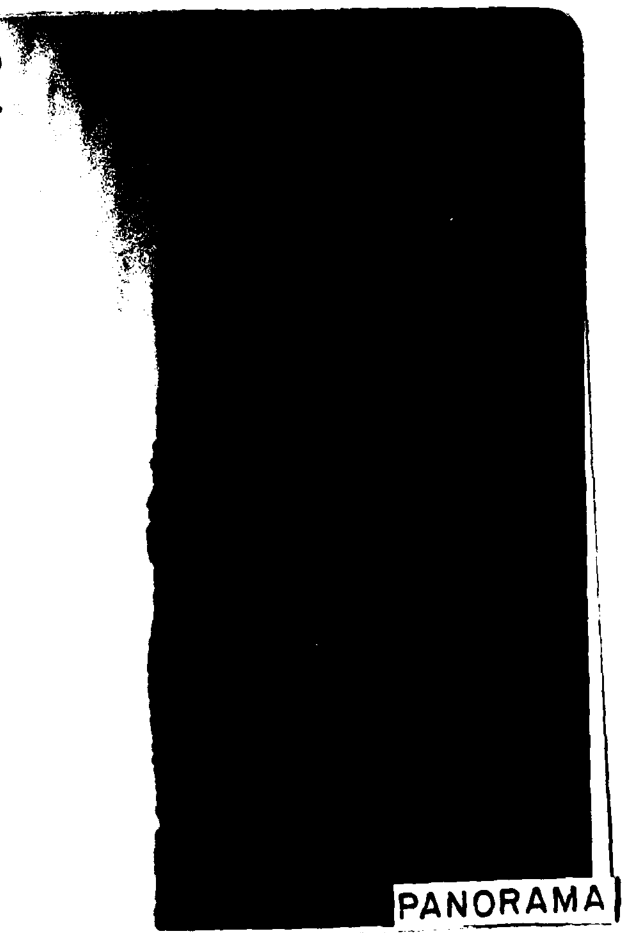
PHOTO INDEX 2
FOR
PANORAMA

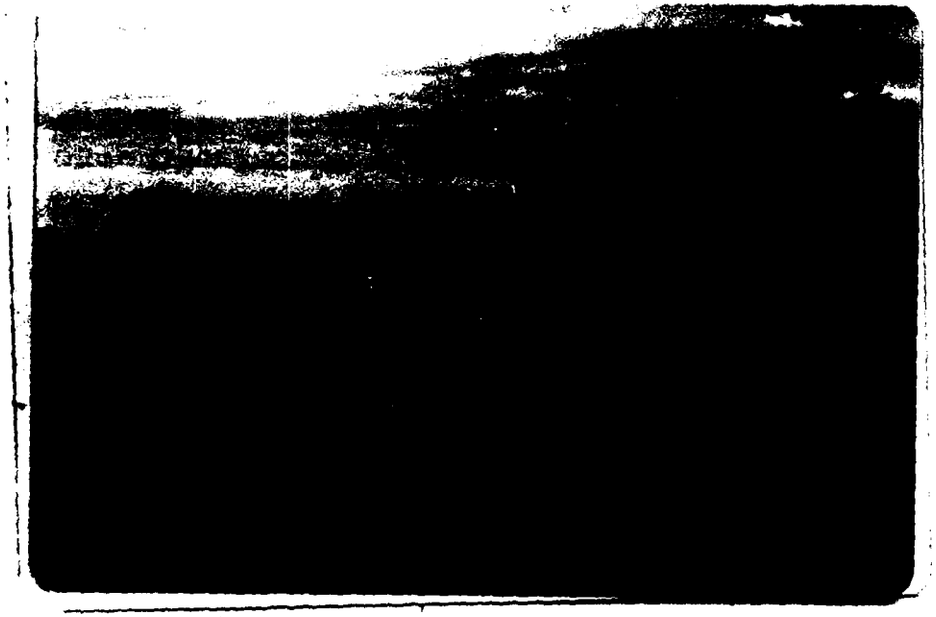
TAMARACK DAM
JEFFERSON COUNTY, MO.
NOVEMBER 1978

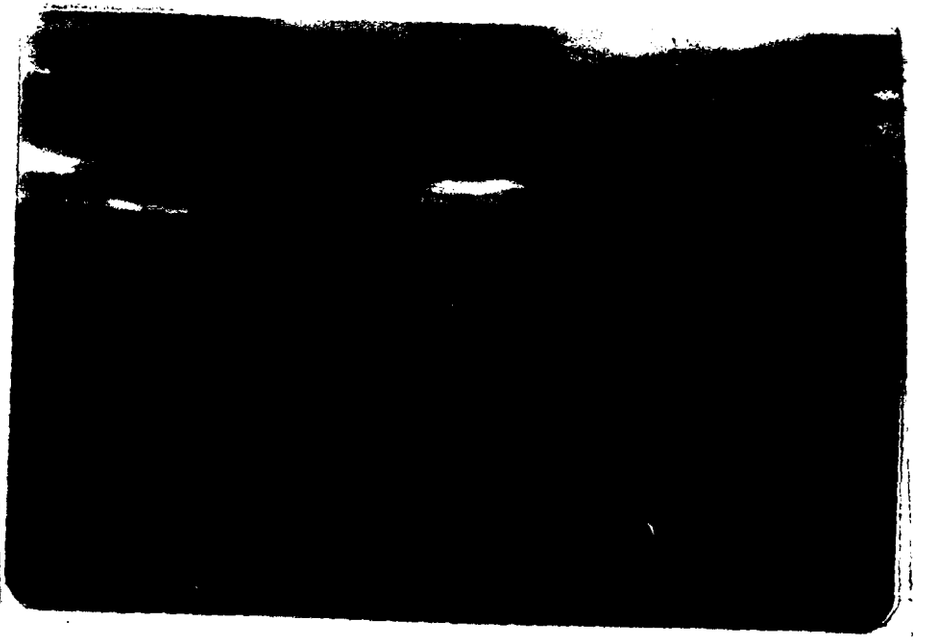
PREPARED BY
REITZ & JENS, INC

P 3









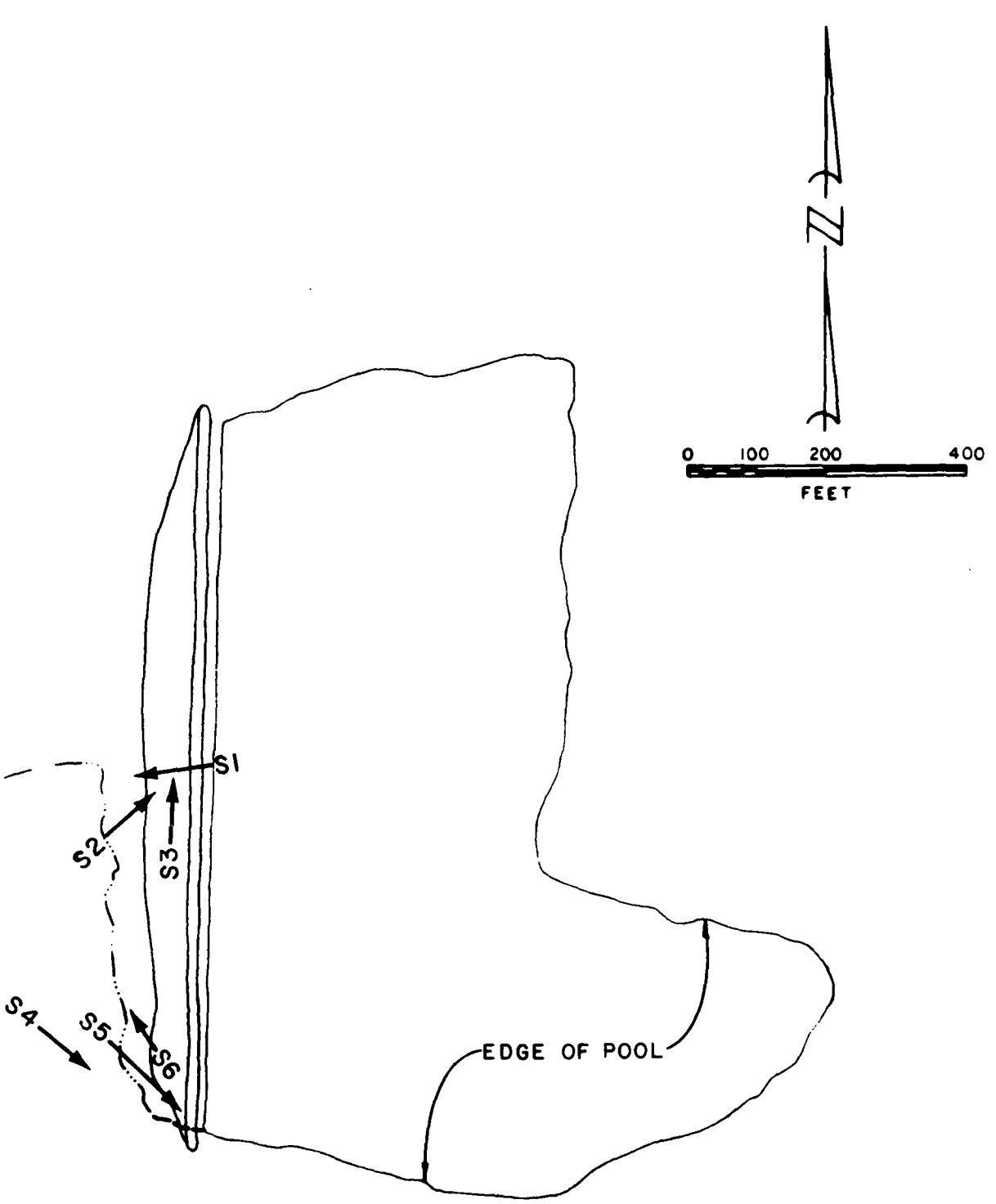
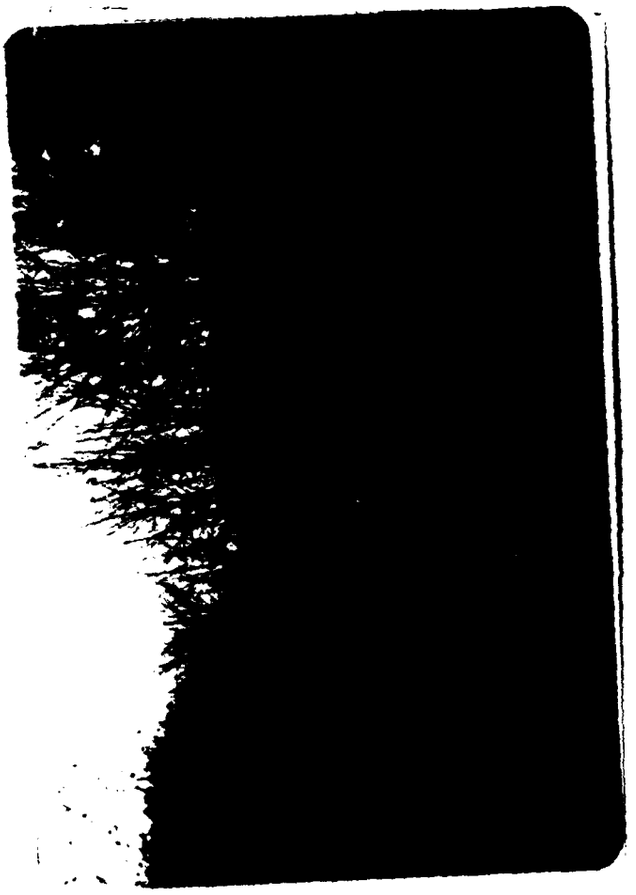
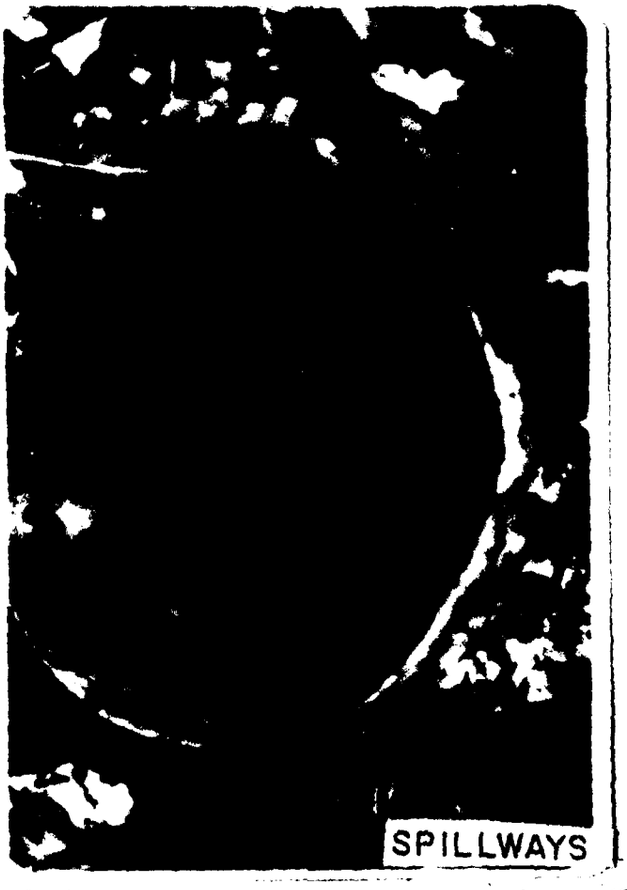


PHOTO INDEX 3
FOR
SPILLWAY

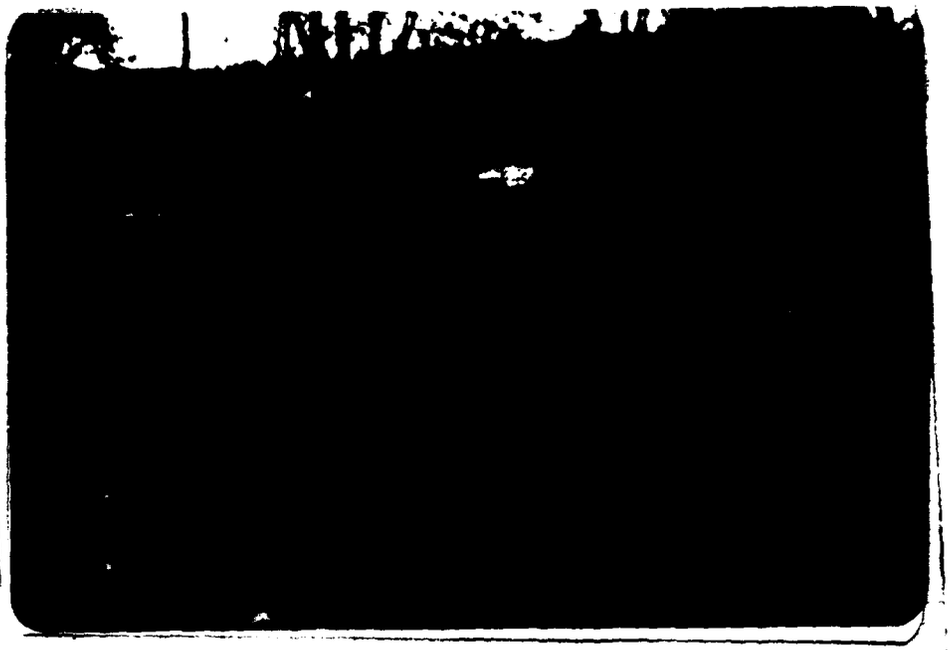
TAMARACK DAM
JEFFERSON COUNTY, MO.
NOVEMBER 1978

PREPARED BY
REITZ & JENS, INC.





SPILLWAYS



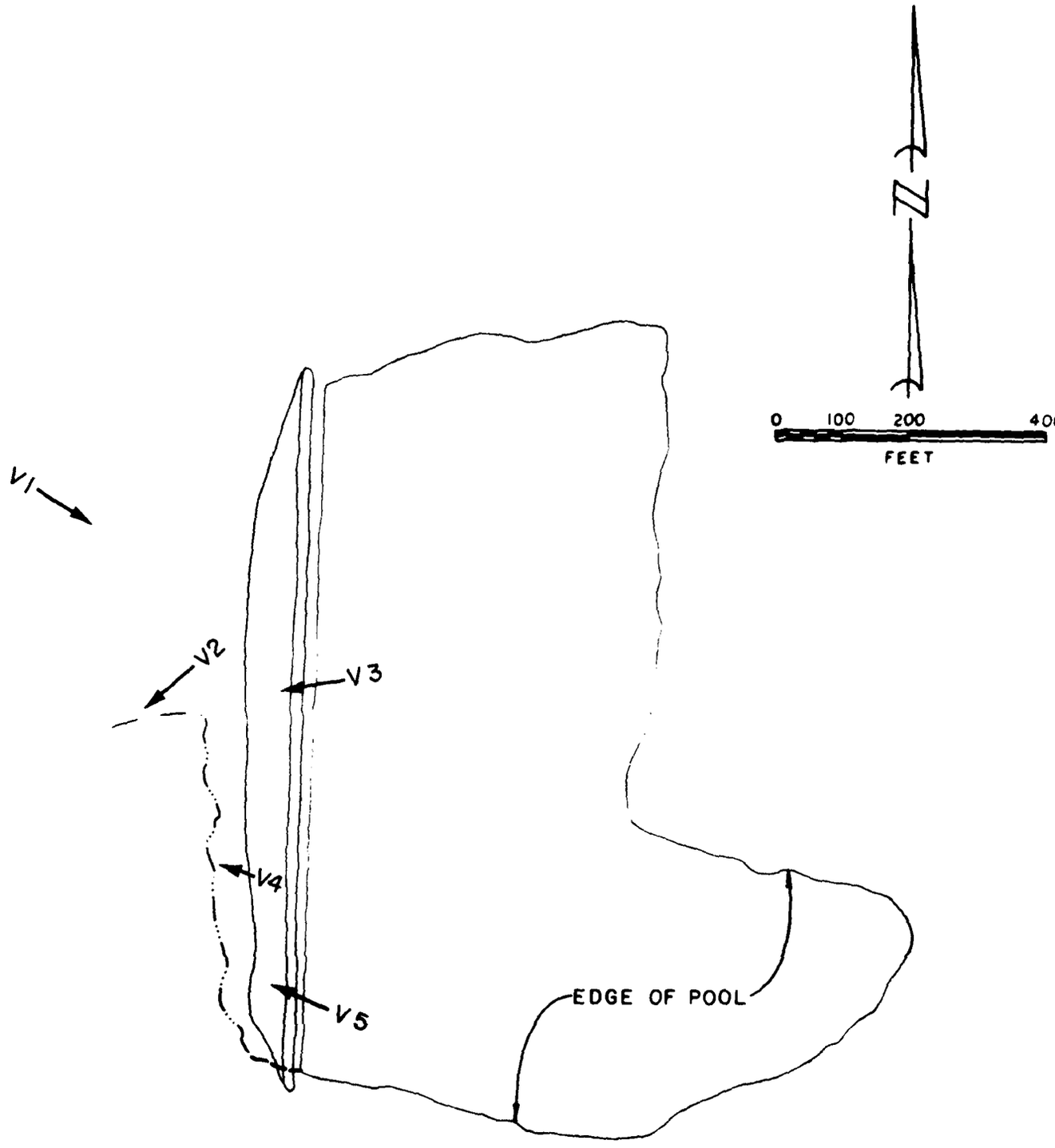
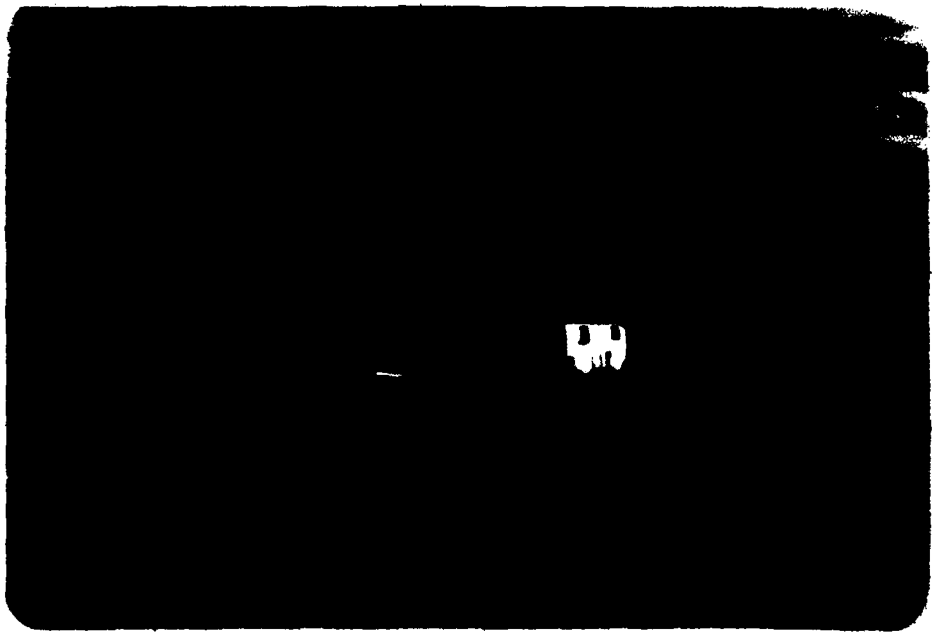


PHOTO INDEX 4
FOR
VALLEY BELOW DAM

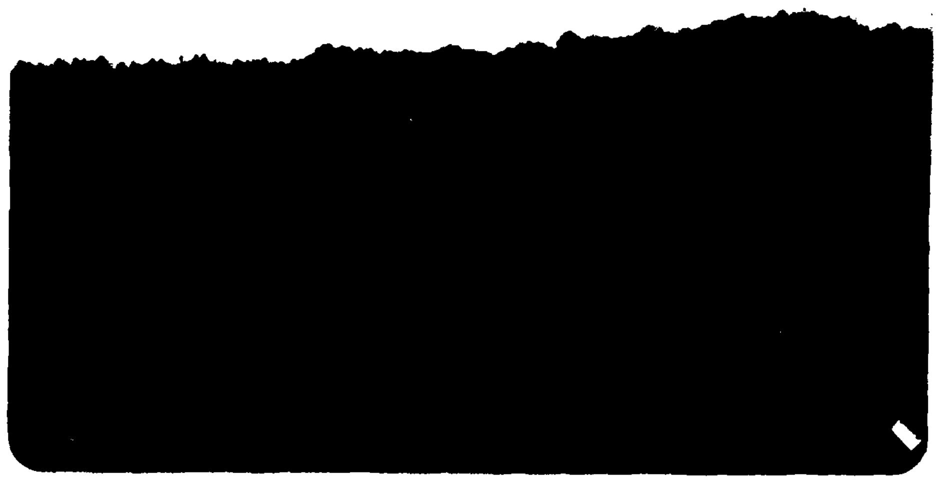
TAMARACK DAM
JEFFERSON COUNTY, MO.
NOVEMBER 1978

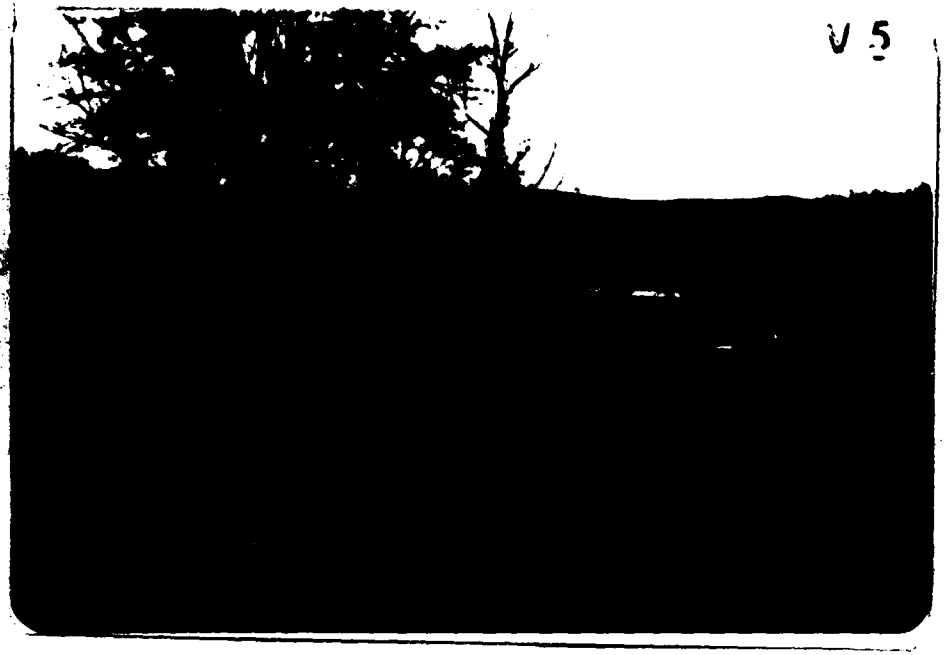
PREPARED BY
REITZ & JENS, INC.



V 3

V 4





V 5

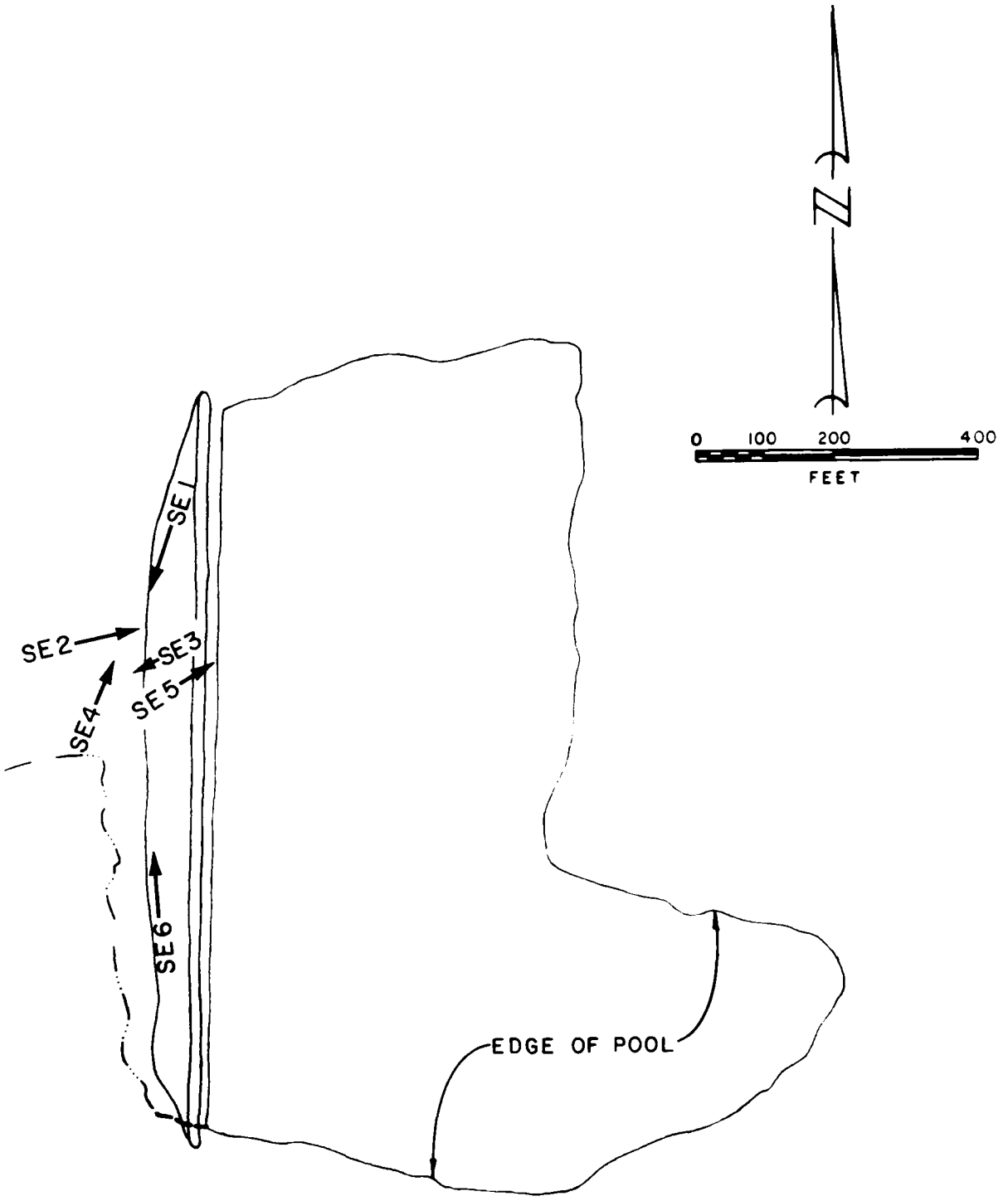
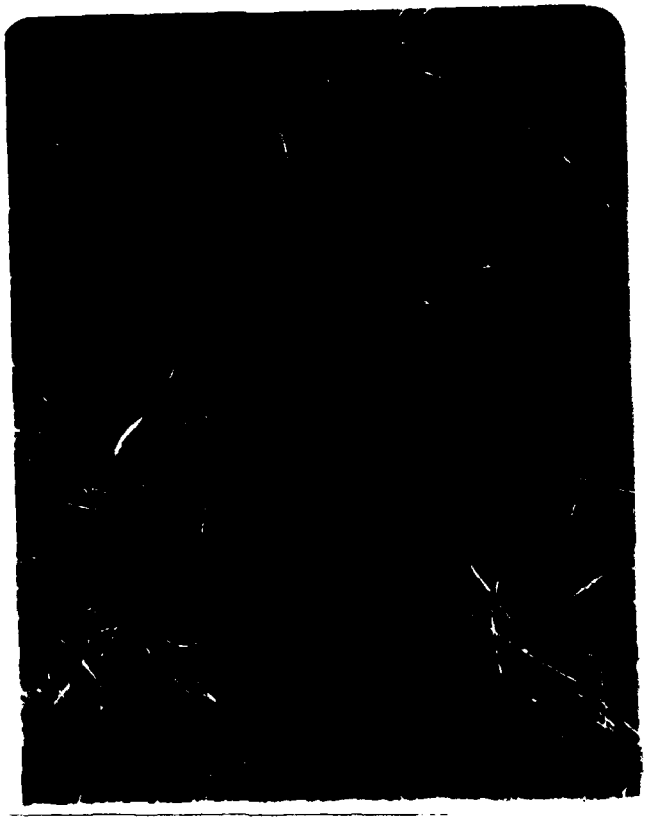
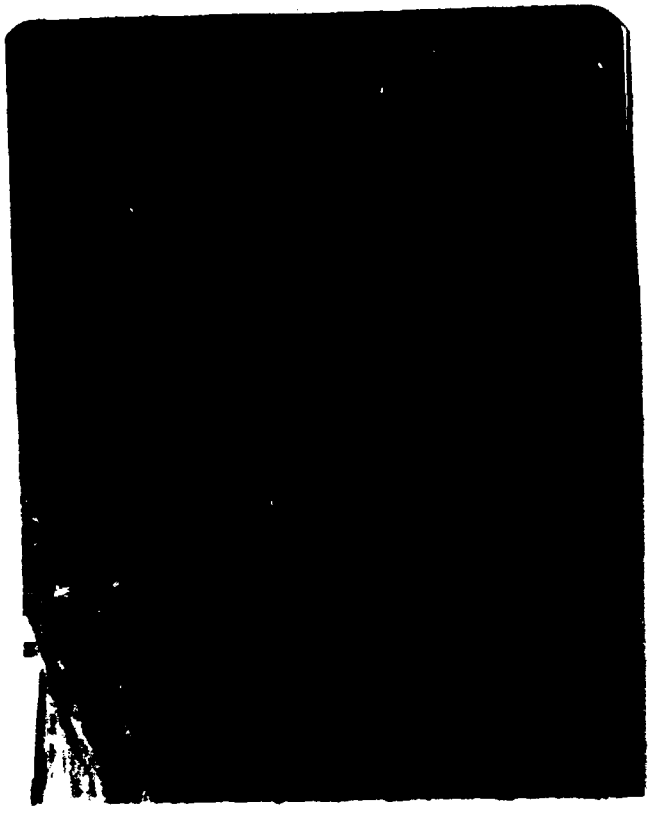


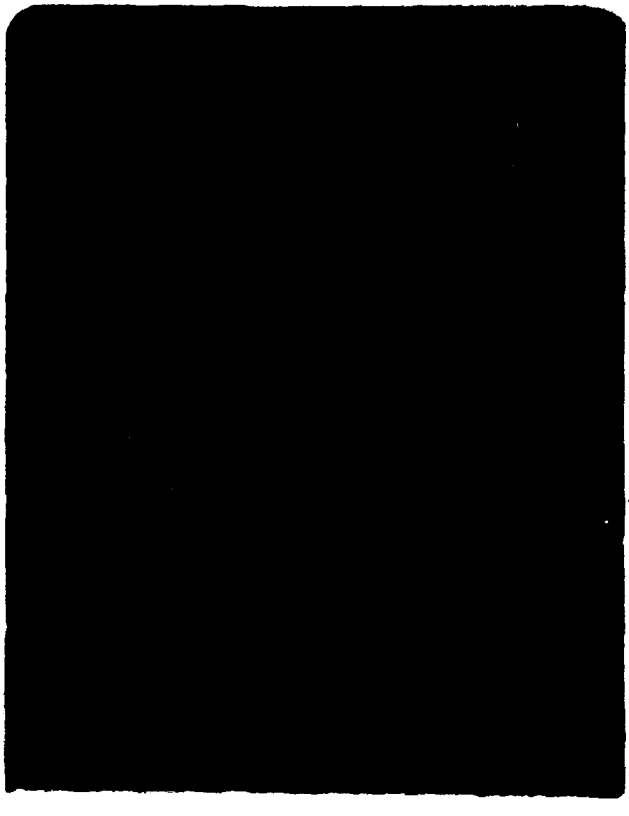
PHOTO INDEX 5
FOR
SEEPAGE

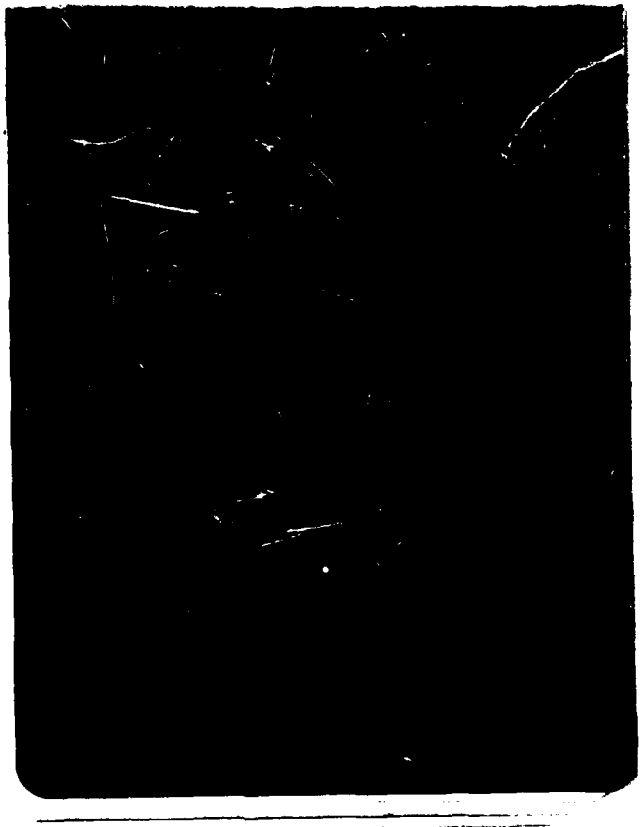
TAMARACK DAM
JEFFERSON COUNTY, MO.
NOVEMBER 1978

PREPARED BY
REITZ & JENS, INC



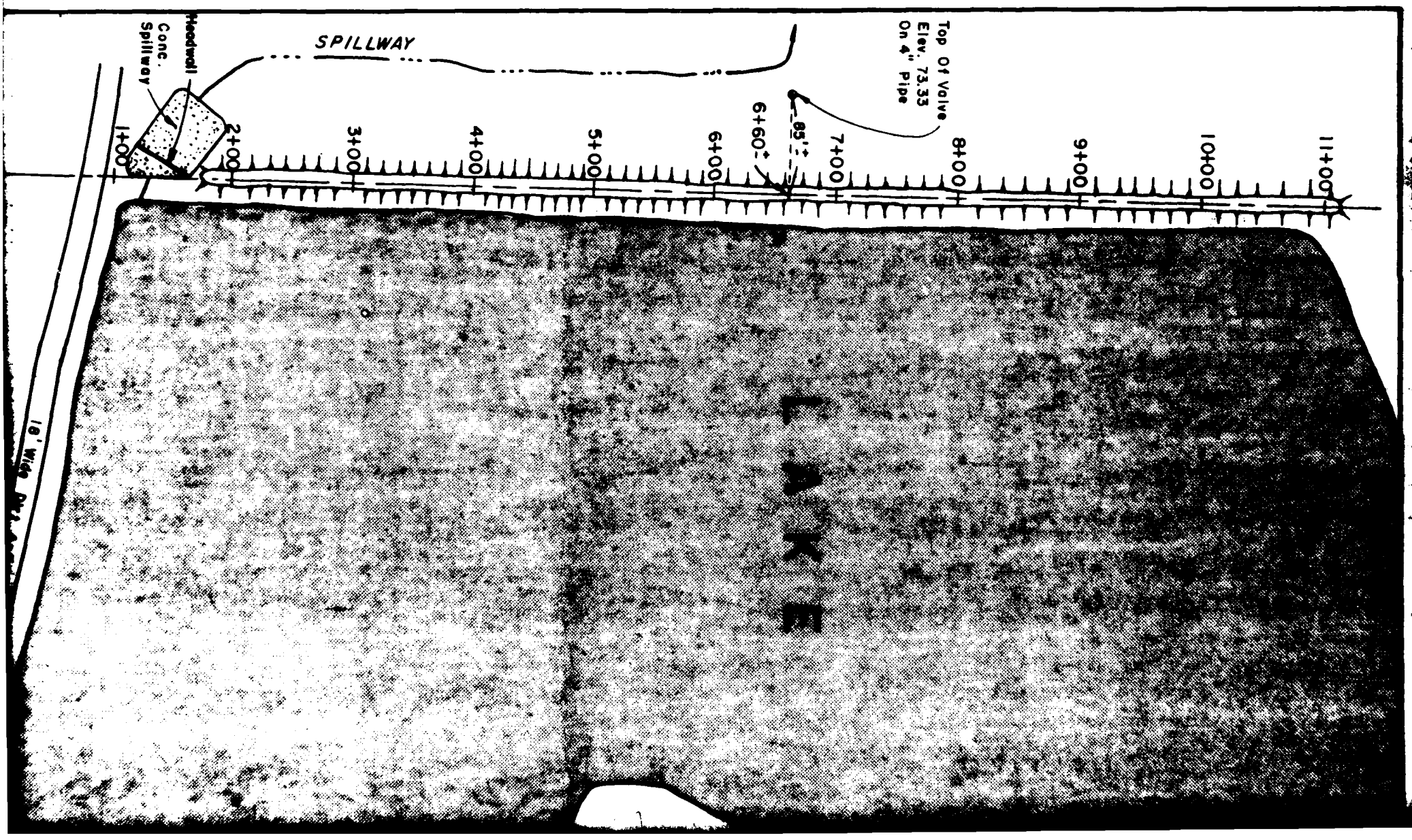


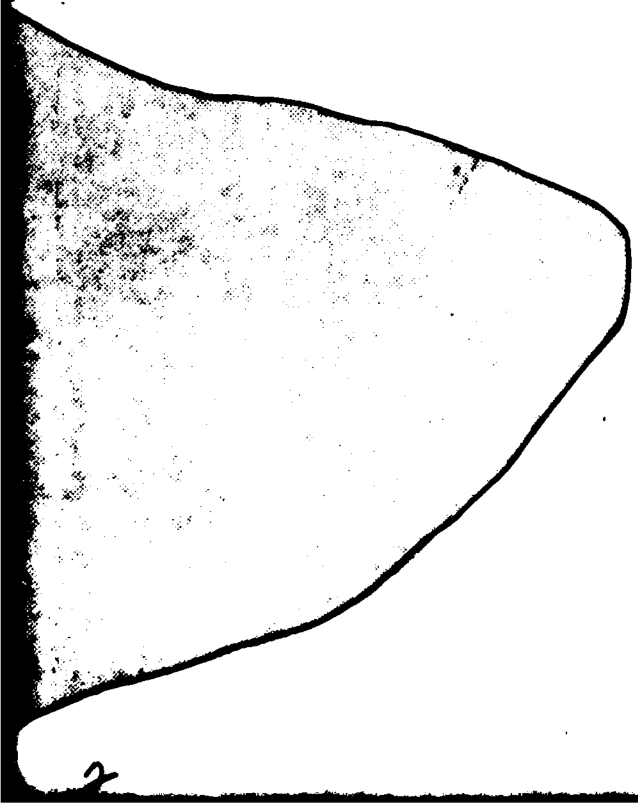




SEEPAGE

FINAL SURVEY		BY	DATE
	SURVEYED		
	PLOTTED		
NOTE BOOK	TEMPLATE		
NO.	AREAS		
	AREAS CHECKED		





PLA

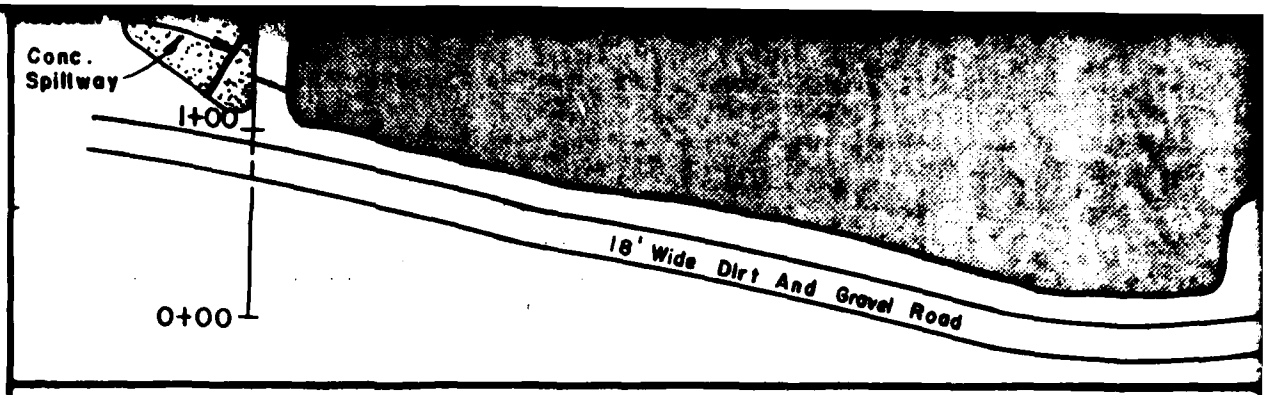
0

OF LAKE

200 400FT

WATE

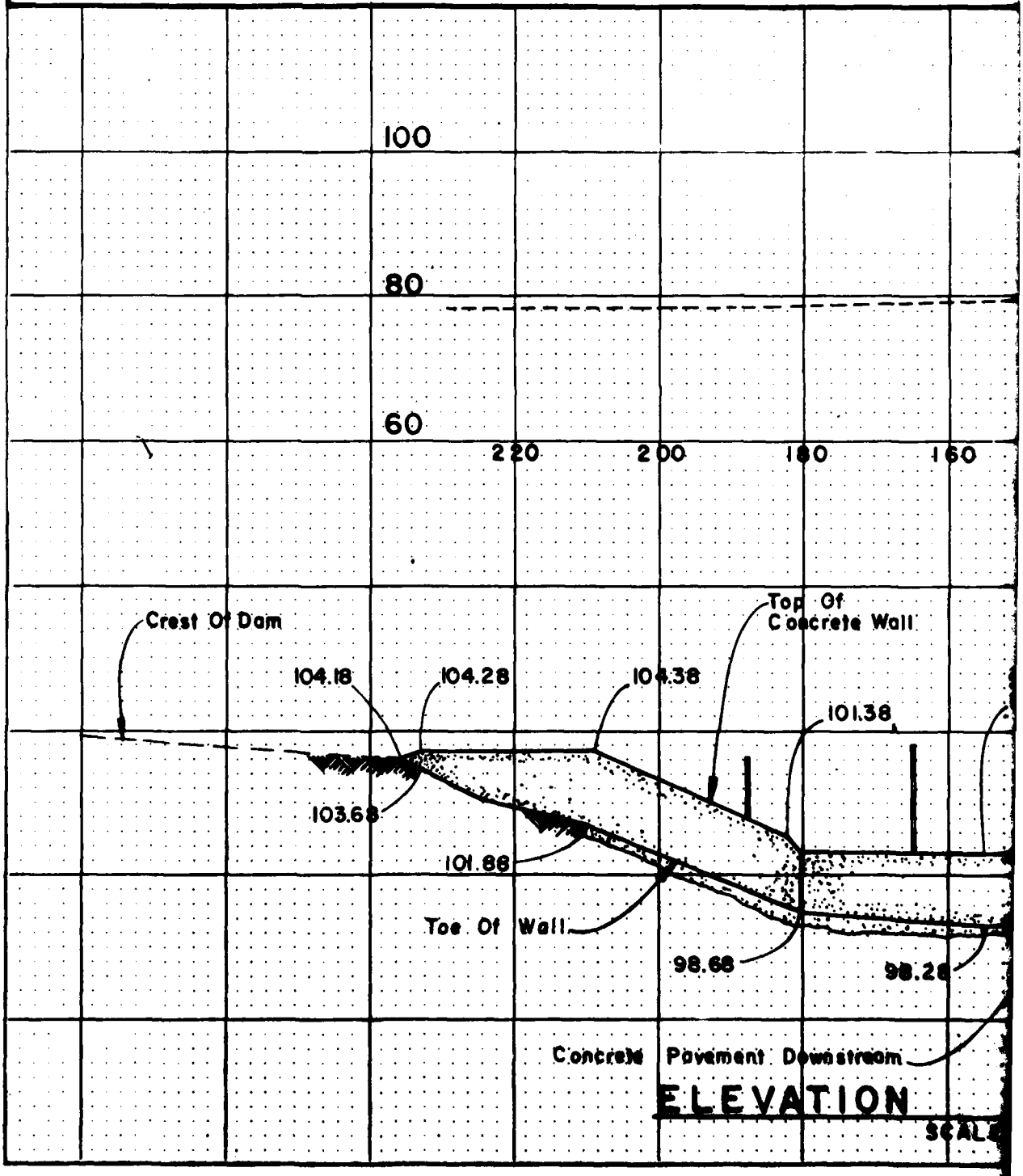

RIVER
TAMARACK
DAM
Creek
Creek
RIVER



PLAN OF DAM AND SPILLWA

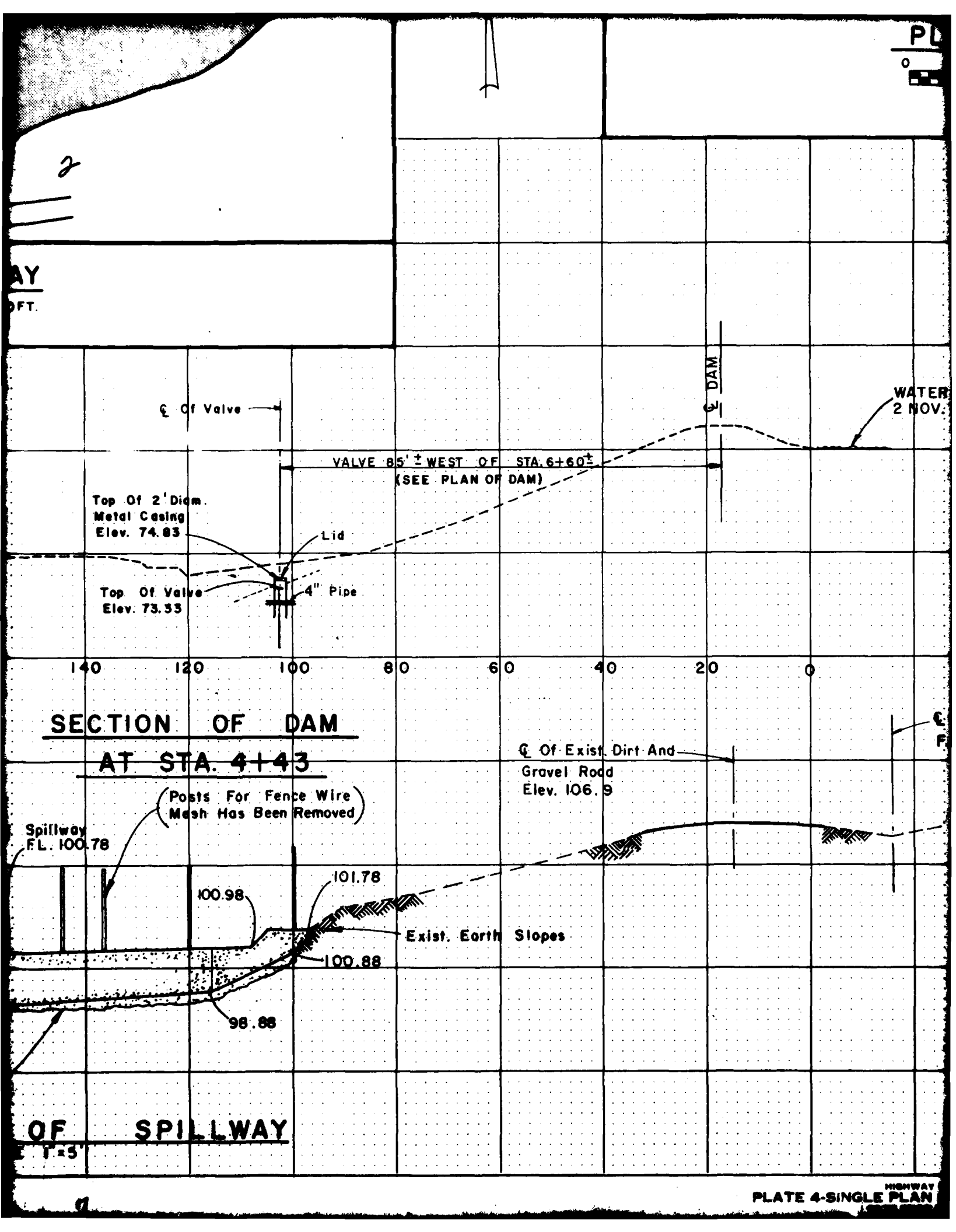
0 50 100 200 300 FT

ORIGINAL SURVEY	NOTE BOOK NO.	SURVEYED	PLOTTED	TEMPLATE	AREAS	AREAS CHECKED	BY	DATE



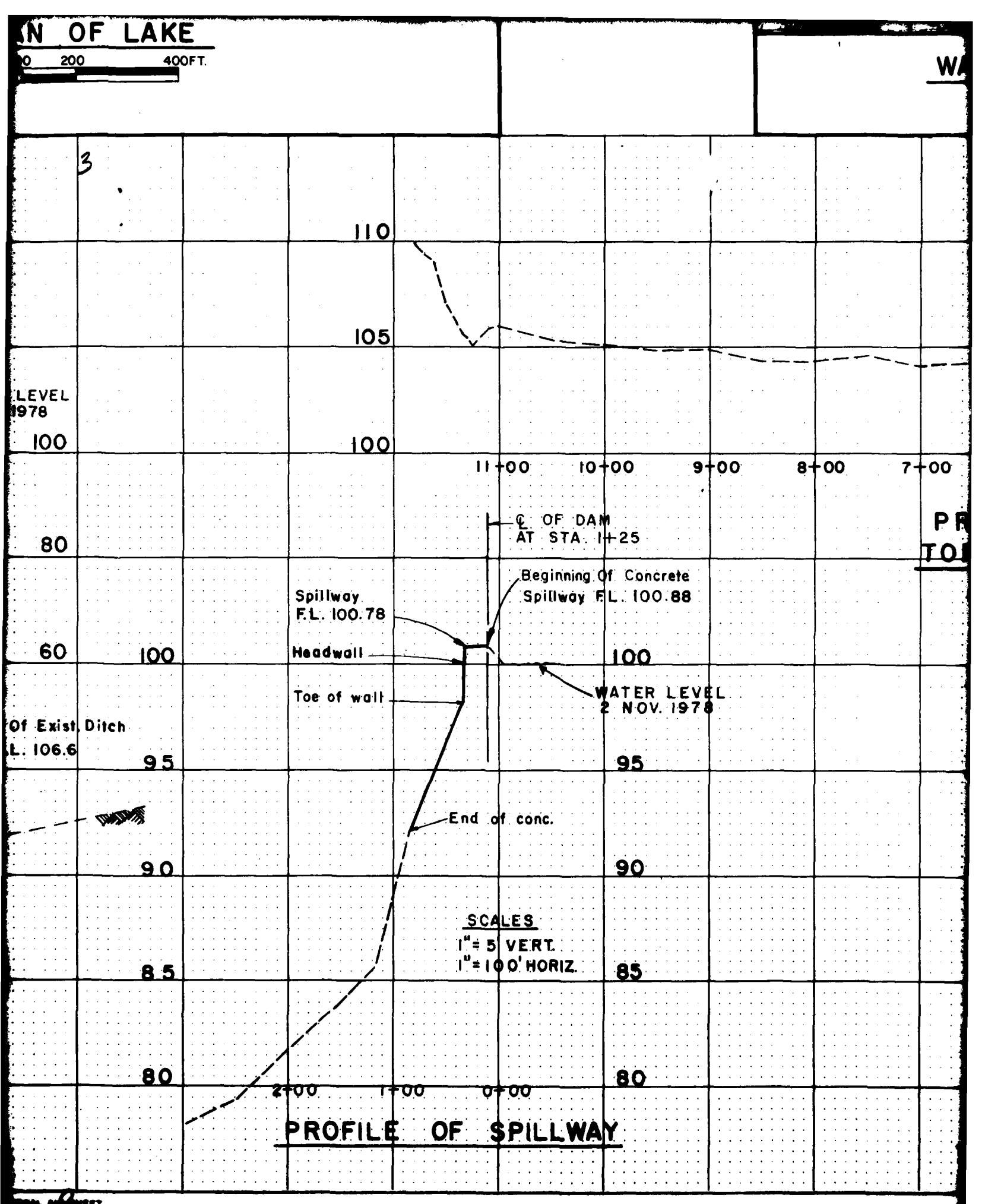
ELEVATION

SCALE


℄ Of Valve
℄ DAM
WATER
2 NOV.
VALVE 85' ± WEST OF STA. 6+60 ±
(SEE PLAN OF DAM)
Top Of 2' Diam.
Metal Casing
Elev. 74.83
Lid
Top Of Valve
Elev. 73.33
4" Pipe
140
120
100
80
60
40
20
0
SECTION OF DAM
AT STA. 4+43
℄ Of Exist. Dirt And
Gravel Road
Elev. 106.9
(Posts For Fence Wire
Mesh Has Been Removed)
Spillway
F.L. 100.78
101.78
100.98
Exist. Earth Slopes
100.88
98.88
OF SPILLWAY
1"=5'
HIGHWAY
PLATE 4-SINGLE PLAN

N OF LAKE

0 200 400FT.



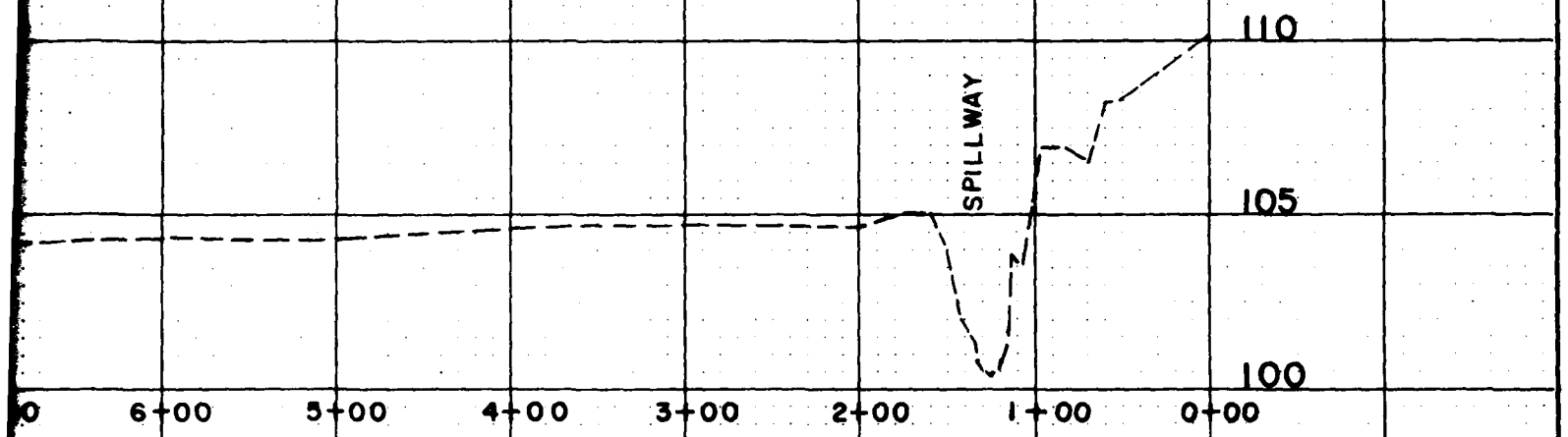
PROFILE OF SPILLWAY

CROSS SECTION-LINE & DOT

ATERSHED AND OUTFLOW CHANNEL

0 1000 2000 4000 6000 FT.

4



PROFILE OF
OP OF DAM

SCALES
1" = 5' VERT.
1" = 100' HORIZ.

TAMARACK DAM

ADD 415' TO ELEVATIONS SHOWN TO OBTAIN APPROX. U.S.G.S. DATUM.

PHASE I — INSPECTION
COUNTY I. D. NO. 099
JEFFERSON COUNTY, MISSOURI

INVENTORY NO. I. D. 30452

FOR ST. LOUIS DISTRICT, CORPS OF ENGINEERS

REITZ & JENS, INC.
CONSULTING ENGINEERS

ST. LOUIS, MISSOURI
DECEMBER 1978

PLATE 3